Commonwealth of Massachusetts
Department of Environmental Protection

NUMERICAL
RANKING SYSTEM
Guidance Manual

310 CMR 40.1500

FORWARD:

This version of the Numerical Ranking System Guidance Manual is an ***Interim Final Policy***, meaning that it is being made available to MADEP staff and the general public with the expectation that day-to-day use of this material will provide insight into how the guidance may be improved. The Massachusetts Department of Environmental Protection (MADEP) Bureau of Waste Site Cleanup is soliciting comments on whether this material provides sufficient guidance to demonstrate that the requirements of the Massachusetts Contingency Plan (MCP, 310 CMR 40.0000) have been met, and on specifice technical guidance and requirements described herein. Users of this document are encouraged to submit comments both on its content and format. Any recommendations for making this document more workable would be welcomed. Please sumit comments on this document to:

Department of Environmental Protection, Bureau of Waste Site Cleanup, Division of Planning and Program Development, One Winter Street, 5th Floor, Boston, Massachusetts, 02116 or on the internet at bwsc.information@state.ma

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INTRODUCTION

This guidance manual has been written to assist users of the Numerical Ranking System (NRS) (310 CMR 40.1500) developed by the Massachusetts Department of Environmental Protection (DEP) to classify disposal sites as defined by the Massachusetts Contingency Plan (MCP) (310 CMR 40.0000) and Massachusetts General Law (MGL) Chapter 21E.

The Numerical Ranking System serves as the basis for the Licensed Site Professional (LSP) proposed Tier Classification Opinion. First, it is used to develop a disposal site-specific score, based on factors such as contaminant characteristics, disposal site location, and potential exposure pathways to classify a disposal site as either Tier I (requiring a Permit and some level of DEP oversight during remediation) or Tier II (requiring no Permit or direct DEP oversight). All disposal sites must be classified using the NRS within one year of release notification unless a Response Action Outcome Statement (310 CMR 40.1000) or an application for Downgradient Property Status (3310 CMR 40.0180) has been submitted to DEP. If a Tier I Permit Application is required, the NRS score is used in the LSP Opinion to support the proposed level of Permit applied for, A, B or C. The numerical score is the starting/default point for DEP's decision on a final permit category, but is not the only consideration.

The Numerical Ranking System is divided into six (6) sections allowing a potential total disposal site score of 1,320 points. No disposal site is expected to generate the maximum score.

		Maximum Potential Score
I.	Disposal Site Information	no points assigned
II.	Exposure Pathways	700 points
III.	Disposal Site Characteristics	180 points
IV.	Human Population and Land Uses	205 points
V.	Ecological Populations	185 points
VI.	Mitigating Disposal Site-Specific Conditions	± 50 points
	TOTAL:	**1,320 POINTS**

NOTE: A disposal site is defined as "any structure, well, pit, pond, lagoon, impoundment, ditch, landfill or other place or area, excluding ambient air or surface water, where uncontrolled oil and/or hazardous material has come to be located as a result of any spilling, leaking, pouring, abandoning, emitting, emptying, discharging, injecting, escaping, leaching, dumping, discarding or otherwise disposing of such oil and/or hazardous material. The term shall not include any site containing only oil or hazardous materials which: are lead-based paint residues emanating from a point of original application of such paint; resulted from emmissions from the exhaust of an engine; are building materials still serving their original intended use or emanating from such use; or resulted from a release of source, byproduct or special nuclear material from a nuclear incident, as those terms are defined in 42 U.S.C. Section 2014, if such release was subject to requirements with respect to financial protection established by the Nuclear Regulatory Commission under 42 U.S.C. Section 2210."

For a full listing of exemptions from notification, see 310 CMR 40.0317.

The disposal site boundary is **not** limited to the boundaries of the property where the release occurred unless the contamination, including the known extent of any groundwater plume, is solely within the property's boundaries. The boundaries of disposal sites may be defined as less than the facility's property boundaries if the contamination is located solely within a portion of the property.

Once the disposal site boundaries are defined, these same site boundaries must be used in all parts of the NRS when questions concerning status of, or proximity to, the disposal site are asked.

Basis for Disposal Site Scores

The initial disposal site classification score is based upon data developed during a Phase I - Initial Site Investigation (as defined in the MCP, 310 CMR 40.0480) or actions taken under Subpart D of the MCP or generated as a result of comprehensive response actions (Subpart H). *All* information used to score the NRS must be documented in the Phase I and other report(s); the NRS is not a stand-alone document. Licensed Site Professionals (LSPs) should exercise their professional discretion to determine the level of effort needed to complete a Phase I for any given disposal site in accordance with the Response Action Performance Standard (RAPS) standard (310 CMR 40.0191).

For example, four environmental media are scored in Section (§) II, Exposure Pathways. However, it is not necessary to analyze all four media to complete this section of the NRS. The LSP may conclude, using RAPS, that one or more media are not affected by the oil or hazardous materials (OHM) present at the disposal site. If this is the case, the LSP must include in the Phase I or later report(s) the technical justification for why a media is not and is not anticipated to be affected.

DEP wishes to stress that the NRS and the Phase I or other report require presentation of information in a specified manner and order. The development, analysis, and interpretation of the data that is needed to accurately understand and classify a disposal site relies upon the professional skills and judgement of the persons involved in the design and implementation of individual disposal site investigations.

Using the NRS to Reclassify Disposal Sites Based Upon New Information

The MCP requires that classified disposal sites be re-scored when new information is learned that may, in the LSP's opinion, lead to a reclassification of a disposal site. Subpart E, Tier Classification (310 CMR 40.0500), and Subpart G, Tier I Permits (310 CMR 40.0700) of the MCP provide the details for when and how to reclassify disposal sites. As with an initial site classification, all supporting material must be provided with the NRS scoresheet in a reclassification and a permit application or modification.

Notes on Use of the Numerical Ranking System:

1) **Risk Reduction:** *DEP strongly supports the use of risk reduction activities. Accordingly, if remedial actions have been taken in accordance with the provisions of the MCP, prior to completion of the NRS, only the contaminants, concentrations and exposure pathways present <u>after the action(s)</u> should be scored, provided such actions have been documented in the classification submittal.* For example, if a "pump and treat" system has been installed as a RAM or IRA at a gas station, and its use has reduced concentrations of gasoline from 14,000 µg/l to 100 µg/l in groundwater, the NRS score need reflect only this lower level as long as the following conditions have been met: the installation and operation of the system was in accordance with the MCP; the treatment has resulted in permanent reduction of the contaminant concentrations or ongoing treatment maintains lower concentrations; and the classification submittal documents the remaining concentrations of the contaminant.

2) **General Approach:** DEP recognizes the limitations of the Phase I Initial Site Investigation. In situations where the Phase I does not provide sufficient certainty to definitively respond to a specific Section or subsection of the NRS, DEP suggests that the answers provided and resultant score reflect a *reasonable, but generally conservative interpretation* of disposal site conditions and information based on the best professional judgement of the LSP and RAPS; for the majority of cases, DEP does not expect LSPs to score disposal sites based on the *worst case* or *most conservative* scenarios.

3) **Extenuating Circumstances:** DEP also recognizes that there will be situations where a site may not exactly "fit" the NRS scoring criteria in a specific Section or sub-section. In these cases, the LSPs still must score the site according to the directions in the NRS. Section VI of the NRS may then be used, where appropriate, to amend the score. For example, a site located within an Interim Wellhead Protection Area (IWPA) appears to be separated from the water supply well by a basin divide on the DEP Water Supply Atlas. During the Phase I classification, this site must be scored as being within the IWPA. Points may be subtracted in Section VI provided there is documented site specific hydrogeologic information to substantiate the analysis.

When a Tier I site is being reclassified through a Permit Modification to downgrade the site based on a Phase II report, if the site is clearly shown to be within a different drainage basin, the presence of the IWPA need not be scored. All Permit Modifications, including a proposed LSP Opinion for reclassification are subject to DEP approval.

4) **Maps:** Many of the environmental factors evaluated in the Numerical Ranking System have been placed on the Massachusetts Geographic Information System (MassGIS). GIS maps indicating the location of all GIS-mapped scoring factors are available from MassGIS and for review at the DEP Regional Service Centers. Alternatively, LSPs with access to ARC/INFO or compatible software may generate disposal site specific maps. GIS maps should be treated as an informational aid in scoring disposal sites. As with any resource, users of the NRS are encouraged to verify the accuracy of the data. Requests for maps or digital data should be submitted to MassGIS (617) 727-5227. A request form is available from DEP Regional Offices or online at www.state.ma.us/mgis/order.htm.

5) **Analytic Data:** All environmental data must be scientifically valid and defensible, and must achieve the level of precision and accuracy required for intended use of the data (See 310 CMR 40.0017).

I. DISPOSAL SITE INFORMATION

Page one (1) of the NRS Scoresheet is divided into two (2) parts. The top part (shown below) is filled in after the NRS is completed. This section provides a quick overview of the disposal site's status in the MCP process, its relative hazard ranking, score, and the level of the Tier I Permit application being submitted.

CLASSIFICATION SUBMITTAL	
Initial Submittal ☐	Re-Classification ☐

DISPOSAL SITE SCORE					
II	III	IV	V	VI	TOTAL
___	___	___	___	___	_____

Disposal Site Tier Classification	I			II
Proposed Permit Level (Tier I Only)	A	B	C	

Classification Submittal: Check the "Initial Submittal" box if this is the first classification of this disposal site using the NRS. Check "Re-Classification" if this NRS classification is being submitted as a result of new information.

Disposal Site Score: Complete this section following completion of the NRS Scoresheet. Copy the scores determined for each Section to the appropriate box.

Disposal Site Tier Classification: Enter Tier II if the disposal site score is less than 350 points; Enter Tier I if the score is 350 or greater or is a categorical Tier I.

Proposed Permit Level: This entry indicates permit application level being submitted to DEP. Enter Tier IC if the disposal site score is between 350 and 449 points *or* if the disposal site score is less than 350, but the disposal site is a categorical Tier I. Enter Tier IB if the score is between 450 and 549 points. Enter Tier IA if the score is 550 or greater. Actual permit levels incorporate additional factors, and are determined by DEP.

The remainder of the first page consists of Section I., which requires basic information such as the disposal site name, location, the LSP conducting the disposal site assessment, and categorical Tier I classification criteria.

DEP Release Notification Number	
DEP Disposal Site Number	*DO NOT USE*

UTM Coordinates	N:
	E:

Disposal Site Name	*OPTIONAL*
Disposal Site Address	
	City: Zip:

DEP Release Notification Number: Now called a "Release Tracking Number" (RTN), this number is assigned by DEP for all releases reported after October 1, 1993. If the NRS is being completed for a disposal site listed by DEP prior to October 1, 1993, provide the existing Disposal Site Number in this space. Release Tracking Numbers for new sites are available from DEP Regional offices. Disposal sites can be made up of one or more RTN numbers. If this is the case, the lead RTN number will be the lowest chronological RTN number and the single identifier to be filled in this space.

DEP Disposal Site Number: Leave this space BLANK. Disposal Site Numbers for "old" sites should be listed in the space provided for Release Tracking Number. Disposal Site Numbers for sites listed prior to October 1, 1993, are found in the List of Confirmed Disposal Sites and Locations to be Investigated (August 1993) published by DEP.

Universal Transverse Mercator (UTM): Provide the UTM coordinates for the disposal site. UTM coordinates can be derived from USGS topographic maps or by use of a Global Positioning Systems (GPS).

NOTE: UTM coordinates previously provided to DEP have, on occasion, shown inaccurate disposal site locations, for example, in the middle of a lake or the wrong city. Because these coordinates are incorporated into DEP's Geographic Information Systems (GIS) databases, and may be used in determining locational factors in other sections of the NRS, care should be taken to ensure accuracy.

Given the scale of the UTM system, most disposal sites cannot be defined by a single point on a map since disposal site is defined as "that area where contamination has come to be located as a result of a release of oil or hazardous materials (OHM) to the environment." As noted above, the disposal site boundary is **not** limited to the boundaries of the property where the release occurred unless the contamination, including the known extent of any groundwater plume, is solely within said property's boundaries. The boundaries of disposal sites may be defined as less than the facility's property boundaries if the contamination is located solely within a limited portion of the facility property and has little potential for migration.
For purposes of the NRS, DEP suggests the following approaches to select the UTM coordinate.

- For small disposal sites with one source of contamination, determine the UTM coordinates at the source of contamination.
- For disposal sites with multiple sources of contamination, determine the UTM coordinates at the geographic center of the disposal site.
- For disposal sites where the source has been removed or contained *and* where contamination has migrated a significant distance from the source, determine the UTM coordinates at the location where contaminant concentrations are greatest.

Disposal Site Name: Use of a disposal site name is OPTIONAL. If a disposal site name is chosen, that name should be used consistently throughout the remedial process. The disposal site name may be based on the site address (123 Able Street), operator or owner name (Able Baker Chemicals, John Doe disposal site), disposal site use (Able Street Pumping Station), or former disposal site use (Former Able Baker Chemicals). The disposal site name should, in general, seek to reflect an identifying disposal site feature.

Categorical Tier I Classifications: A site is considered a Tier I site, categorically, if one or more of the inclusionary criteria is tripped. Because the NRS score is used in determining Tier I permit level, the entire NRS must be completed for all disposal sites, regardless of categorical classification.

Proximity to Public Water Supply Wells:

Is the Disposal Site classified Tier I because it is located within the boundaries of a Zone II or Interim Wellhead Protection Area and groundwater concentrations are equal to or greater than RCGW-1?	Yes ☐	No ☐

Mark YES if any portion of the disposal site is located within the boundaries of a Groundwater Zone II or an Interim Wellhead Protection Area (IWPA), *and* Reportable Concentration Groundwater category 1 (RCGW-1) are exceeded. RCs are listed in the Massachusetts Oil and Hazardous Material List (MOHML). These disposal sites are categorically classified as Tier I disposal sites regardless of the NRS score.

An IWPA is the interim area of special protection for a public water supply well or wellfields, for which DEP has not approved a hydrogeologically delineated Zone II. The interim area of special protection is a one-half mile radius around the well or wellfields for sources whose pumping rate is 100,000 gallons per day (gpd) or greater. For sources whose pumping rate is less than 100,000 gpd, the protective radius must be calculated by using the following equation:

IWPA (radius in feet) = (32 x pumping rate in gallons per minute) + 400.

Persons completing the NRS should keep in mind in responding to this question and all subsequent elements of the NRS, a "disposal site" is defined as ""that area where contamination has come to be located as a result of a release of oil or hazardous materials (OHM) to the environment." Therefore, if any portion of a contaminant plume above RCGW-1 is located within the Zone II or IWPA, regardless of the location of the source, this question should be answered "yes."

For scoring purposes, Zone II designations and IWPAs are valid for active, emergency, temporarily inactive, and back-up public drinking water sources. Closed or inactive public water supply wells should also be included.

Imminent Hazard Evaluation:

Is the Disposal Site classified Tier I because an Imminent Hazard is present at the time of Tier Classification pursuant to 310 CMR 40.0520(2)(a)(2)?	Yes ☐	No ☐

Mark YES if an imminent hazard condition exists at the disposal site **at the time of classification**. Imminent Hazards are defined in 310 CMR 40.0950.

Adherence to MCP Schedule:

Pursuant to 310 CMR 40.0520(2)(c), is the Disposal Site classified Tier I because a Tier Classification, Permit Application, or RAO has not been submitted to the Department within one year of Release Notification or in accordance with an interim deadline established by the Department?	Yes ☐	No ☐

Mark YES if the one-year deadline for classification or RAO, or an interim deadline have been missed and the disposal site is classified as Tier IB by default.

Opinion: The completed NRS Scoresheet must include the LSP's name, signature, license number, company, telephone number, date of completion, and the name of the RP, PRP or Other Person who will provide certification in accordance with 310 CMR 40.0009.

I certify that I have personally completed this Numerical Ranking System Scoresheet, including any attachments, and that, based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information.

_____	_____	_____
Licensed Site Professional Signature	LSP Registration Number	Date
_____	_____	_____
LSP Name (Printed)	Company Name	Telephone Number

_____

Responsible Party, Potential Responsible Party, or Other Person who will provide certification in accordance with 310 CMR 40.0009.

II. EXPOSURE PATHWAYS

(Scoring Range: 15 - 700) (II.A. + II.B. + II.C. + II.D. + II.E.)

The Section II score is a cumulative assessment of the potential exposure pathways in four media: soil; groundwater, surface water, and air. DEP anticipates that most disposal sites will not require sampling of all four media; the LSP's decision to sample specific media shall be based on RAPS and documented in the Phase I or other subsequent report.

A total Section II score of '0' is not possible as this would indicate that either no release has occurred or, if a release has occurred, that a level of No Significant Risk has been achieved/exists. If the latter condition exists as the result of a previously taken response action(s), a Response Action Outcome (RAO) determination pursuant to 310 CMR 40.1000, should be submitted to DEP. The disposal site should not be scored using the Numerical Ranking System.

The Section II Exposure Pathway score is the sum of the highest scores determined for each media.

II.	**EXPOSURE PATHWAYS** *Score according to 40.1512 - Exposure Pathway Designation Criteria*			
MEDIA	*DESIGNATION*			
	NONE *or* NOT APPLICABLE	EVIDENCE OF CONTAMINATION	POTENTIAL EXPOSURE PATHWAY	LIKELY OR CONFIRMED EXPOSURE PATHWAY
A. SOIL (Includes Sediment)	0	15	100	150
B. GROUNDWATER	0	20	100	150
C. SURFACE WATER (Includes Wetlands)	0	20	100	150
D. AIR	0	15	100	200

Space is provided on the Scoresheet to *summarize* the rationale for Section II (A - D) scoring. Space in this section is deliberately limited. The summary for each media must refer to and be supported by the Phase I or other Report findings, citing relevant pages in the Report.

II. (A - D)	*Summary Rationale for Section II A - D Values and Phase I Report References*
Actual Scoresheet Contains Additional Space	

Disposal sites are scored according to the four media designations. The detailed, media-specific criteria established in regulation (310 CMR 40.1512) for scoring Section II - Exposure Pathways are presented on the following pages along with examples and discussion. LSPs should carefully evaluate the regulatory criteria when scoring this

section. Site conditions that do not meet the media-specific criteria developed by DEP should not be scored using Section II. Where site conditions do not meet Section II criteria, but may pose a level of exposure in excess of that scored in Section II, use Section VI to add points reflective of the potential exposure.

- *None or Not Applicable*. This designation is scored when OHM in a specific medium is not present at the site and is not anticipated to be present at the site. This designation is scored based on either confirmatory analytical data or specific knowledge of disposal site conditions and history. If environmental sample collection of a media is unwarranted based on RAPS, the technical justification for this opinion must be included in the Phase I, and should be referenced in the Summary Rationale Section, II. (A - D).

- *Evidence of Contamination*. This designation is scored when site history, conditions, or qualitative evidence indicate the potential or likely presence of OHM in a medium, or when analytical data confirms a release of OHM to the environment.

- *Potential Exposure Pathway*. This designation assumes the presence of site-related OHM in the medium being scored. This designation is scored when human or environmental receptors may be exposed to OHM as a result of disposal site conditions, or where such exposure may occur if no response action is taken.

- *Likely or Confirmed Exposure Pathway*. This designation also assumes the presence of OHM in the medium being scored. This designation should be scored when human environmental exposure to OHM is confirmed or there is a reasonable likelihood for this to occur.

NOTE: The term "identified" is used throughout the exposure pathway criteria. This term is meant to include knowledge of a release based on anecdotal evidence, site history, field observations, screening data, laboratory data and any other means by which site information is gathered. This information must be documented in a Phase I or other Report.

The criteria for scoring an exposure designation differ in each media according to DEP's level of concern and the availability of appropriate standards. For example, in some media, Evidence of Contamination is scored if OHM is found at detectable concentrations; in other media, the OHM are found at concentrations above a standard such as the Reportable Concentrations to score Evidence of Contamination.

NOTE: If an LRA, IRA, URAM, RAM, or other response action has been conducted at the disposal site in compliance with the MCP prior to classification, complete the NRS according to current disposal site conditions for which documentation is provided; if OHM levels remaining at the site following a response action have been sufficiently documented, do not score according to initial disposal site conditions. Professional judgment should be used in choosing representative data sets to determine if it exceeds the applicable Reportable Concentrations and other standards.

NOTE: When scoring Section II, assign only the highest value scored in each media, i.e., score None or Not Applicable *or* Evidence of Contamination *or* Potential Exposure Pathway *or* Likely or Confirmed Exposure Pathway. The highest possible score in II.A. is 150 points. Scores for Potential Exposure Pathways and Likely or Confirmed Exposure Pathways assume evidence of contamination.

The following tables, discussion, and examples provide criteria and guidance for scoring Section II.

II.A. SOIL 40.1512(1)

II.A.	**SOIL EXPOSURE CRITERIA**	
DEFINITION	Soil includes sediments.	
DESIGNATION	*CRITERIA*	POINTS
NONE *or* NOT APPLICABLE	*Either of the Following* ➢ OHM likely attributable to the disposal site has not been identified in, and is not anticipated to be identified in, soil. *or* ➢ OHM has not been identified in soils at concentrations equal to or greater than applicable soil Reportable Concentrations (RCs). This criteria may be met by conducting a response action in accordance with these regulations to reduce soil concentrations.	0
EVIDENCE OF CONTAMINATION (Assumes No Exposure Pathway)	*Any of the Following* ➢ A release of OHM to soil has been identified but no laboratory analysis has been conducted. *or* ➢ Qualitative evidence of a release. • OHM stained soils *or* • Distressed vegetation *or* • OHM-attributable odors *or* *or* ➢ OHM has been identified in soils at concentrations ≥ applicable RCs.	15
POTENTIAL EXPOSURE PATHWAY	*All of the Following* ➢ OHM has been identified at concentrations ≥ applicable soil RCs ≤ 6" from the accessible soil surface. OHM located beneath unbroken paved surfaces/concrete slabs may be considered inaccessible. *and* ➢ Efforts to restrict access to the area where a release of OHM has been identified have been unsuccessful, have not been taken, or are infeasible. Fencing may be sufficient to show restriction of access unless there has been evidence of repeated access to areas of OHM-contaminated surficial soils. *and* ➢ The area of OHM contamination is not used for active recreation.	100
LIKELY or CONFIRMED EXPOSURE PATHWAY	*All of the Following* ➢ OHM has been identified at concentrations ≥ applicable soil RCs ≤ 6" from the accessible soil surface. *and* ➢ Efforts to restrict access to the area where a release of OHM has been identified have been unsuccessful, have not been taken, or are infeasible. *and* ➢ The area of contamination is used for active recreation (e.g., bicycling, dirt-biking, playground, or ballfield) or gardening.	150

SOIL DISCUSSION

Principal Focus: Before development of the NRS, DEP determined whether conditions at the disposal site provide the opportunity for direct contact with OHM, or whether there is data that indicate surface contamination at concentrations that could adversely affect human or environmental receptors. This section of the NRS incorporates these concerns and focuses on direct contact and ingestion. In any area where children are present, the LSP should pay special attention to identifying possible conditions that could result in human exposure. Inhalation of soil particulates is addressed in Section II.D. (Air).

NOTE: The MCP definition of soil excludes sediment, and they are considered two distinct terms. For NRS scoring purposes only, however, sediments and soils are grouped together, and Section IIA should be scored for soil and/or sediments.

Reportable Concentrations: The criteria for determining which Reportable Concentrations (RCs) are applicable for scoring Section II.A are found in 310 CMR 40.1600, The Massachusetts Oil and Hazardous Materials List (MOHML), Tables 1 and 2. Two categories of RCs for soil are listed (RCS-1 and RCS-2). LSPs must use the category appropriate to the site being classified.

Determining Accessibility: One of the key factors in determining whether or not surficial contamination is accessible is the presence or absence of an unbroken pavement/concrete surface covering the soil. Determining the integrity of a paved/concrete surface is often judgmental. Most paved/concrete surfaces have cracks and most sites are not completely paved. For example, on many sites, the areas above USTs may be paved, but this area may be surrounded by a grassy lawn. Other sites may present a situation where most of the property is paved, but there are areas of exposed OHM-contaminated soil; situations such as this would generally indicate a potential exposure pathway. In all cases, the LSP should consider how the surface cover affects the potential for direct contact with and/or ingestion of the soils.

Another key factor in determining accessibility is site security. Fences are often installed at sites to successfully restrict access. However, at some sites where there is fencing, there is also often clear evidence that children, off-road vehicle users, or others are entering the site. In general, if a fence has not been cut and there is no evidence that anyone is entering the area of surficial OHM contamination, the LSP should score the site as "Evidence of Contamination," rather than "Potential Exposure Pathway." Conversely, regular or recurrent sightings of footprints or bicycle tire tracks should indicate to the LSP that "Likely or Confirmed Exposure Pathway" is the appropriate designation. DEP does not consider wooden "snow fences" as adequate for determining that a site is inaccessible. An alternative to fencing, which may also be evaluated, are situations where a security system (patrols, surveillance cameras, proximity alarms, etc.) are in use at a site. These systems may also be considered as factors preventing accessibility, keeping in mind that the potential exposure of security personnel as well as on-site workers or frequent visitors must also be considered.

Solid and semi-solid contaminants: OHM in solid or semi-solid phase, present on or in soil or sediment, (e.g., coal tars) that has been identified as being accessible should be scored for *Soil* as "Potential Exposure Pathway" or "Likely or Confirmed Human Exposure".

Examples for scoring Soil:

EXAMPLE II-A-1

Scenario: The site contains OHM in surficial soils above RCs. The site is paved except for a small landscaped area. No contamination was detected in landscaped area soils.
Score: 15 (Evidence of Contamination)
Rationale: Because the one area of potential exposure (the landscaped area) contains no OHM, only the criteria for Evidence of Contamination is met.

EXAMPLE II-A-2

Scenario:	A site has a soil pile remaining from an excavation of contaminated soil. The pile is covered with plastic sheeting and a snow fence surrounds the pile. Like many such piles, the plastic has tears in it. There are children's' footprints on the soil.
Score:	150 (Likely or Confirmed Exposure Pathway)
Rationale:	DEP does not consider snow fences sufficient to restrict access to OHM contamination. The presence of footprints is adequate to score for active "recreational exposure." If there had been no footprints, the score of 100 (Potential Exposure Pathway) would have been assigned, given the presumed inadequacy of a wooden snow fence to restrict access.

EXAMPLE II-A-3

Scenario:	The site has a soil pile containing OHMs above RCs, with a torn plastic covering and a snow fence. A gas station operator is present at the gas station at all times.
Score:	150 (Likely or Confirmed Exposure Pathway
Rationale:	The presence of the station operator should not be interpreted as sufficient to prevent site access. The purpose of this employee is not as a security guard and should not be interpreted as such.

EXAMPLE II-A-4

Scenario:	An IRA was conducted to remove contaminated soils from an area surrounding a leaking underground storage tank. Confirmatory sampling determines no residual soil contamination at concentrations greater than the applicable soil RCs.
Score:	0 (None or Not Applicable)
Rationale:	Risk reduction has allowed the site to meet the criteria for None or Not Applicable.

EXAMPLE II-A-5

Scenario:	Soil sampling in the area surrounding a removed UST confirms the presence of contaminants in soil above RCs. No response action beyond tank removal and limited soil excavation has been conducted at the disposal site. The excavation has been covered with clean fill and there is no evidence of surficial soil contamination.
Score:	15 (Evidence of Contamination)
Rationale:	Although a source has been removed, a source of OHM remains at the site.

EXAMPLE II-A-6

Scenario:	Soil sampling in the area surrounding a removed UST confirms the presence of contaminants in soil above RCs. No response action beyond tank removal has been taken at the disposal site. The excavation remains as an open pit; no trespass is evident.
Score:	100 (Potential Exposure Pathway)
Rationale:	Site conditions create the potential for human exposure to the contaminated soil.

EXAMPLE II-A-7

Scenario:	There is confirmed soil contamination above RCs in the first 6 inches of the soil surface. However, the disposal site is paved and used for a parking lot.
Score:	15 (Evidence of Contamination)
Rationale:	The substantially unbroken pavement prevents contact with contaminants by users of the parking lot.

EXAMPLE II-A-8

Scenario:	Soil contamination is confirmed at levels that exceed RCS-1 but are less than RCS-2. The disposal site is located in an industrial park; the property and surrounding areas are zoned for exclusive commercial/industrial use; no schools or residences are located within 500 feet; there is a low likelihood of exposure of children to disposal site contaminants; and, the disposal site is not located within a groundwater resource area.
Score:	0 (None or Not Applicable)
Rationale:	Because the site area meets criteria for RCS-2, only releases exceeding RCS-2 levels would be scored.

EXAMPLE II-A-9

Scenario:	Soil contamination is confirmed at levels that exceed RCS-1 but are less than RCS-2. Like the previous example, the disposal site is located in an industrial park and there is a correspondingly low likelihood of exposure of children to disposal site contaminants; the disposal site is not located within a groundwater resource area; and, the property and surrounding areas are zoned for exclusive commercial/industrial use. However, there are residences adjacent to the disposal site.
Score:	15 (Evidence of Contamination)
Rationale:	Because of the existing nearby residences, RCS-1 applies.

EXAMPLE II-A-10

Scenario:	Contaminants are present at the soil surface at concentrations greater than RCS-1; bicycle-tire tracks pass through OHM-contaminated areas of the disposal site.
Score:	150 (Likely or Confirmed Exposure Pathway)
Rationale:	There is evidence that people are entering the property and using the site for active recreation.

EXAMPLE II-A-11

Scenario:	Low levels of VOC contamination in soil are confirmed using headspace analysis. The disposal site is located in an industrial park; the property and surrounding areas are zoned for exclusive commercial/industrial use; no schools or residences are located within 500 feet; there is a low likelihood of exposure of children to disposal site contaminants; and, the disposal site is not located within a groundwater resource area.
Score:	15 (Evidence of Contamination)
Rationale:	Section II.A. criteria require a higher score only if one or more of the criteria for exposure pathways are met.

EXAMPLE II-A-12

Scenario:	A site located in an industrial area is predominantly paved. "Small" areas of exposed OHM-contaminated soil exist due to gaps in the pavement.
Score:	100 (Potential Exposure Pathway)
Rationale:	While the site is predominantly paved, the patches of exposed OHM-contaminated soil meet the criteria for scoring an exposure pathway.

EXAMPLE II-A-13

Scenario:	A site was investigated using only field screening devices, including a photo ionization detector for volatile organics, based on a preliminary site assessment and RAPS. No significant contamination was detected.
Score:	NA
Rationale:	Field screening data alone is not sufficient to complete the NRS.

II.B. GROUNDWATER 40.1512(2)

II.B.	**GROUNDWATER EXPOSURE CRITERIA**	
DEFINITION	Score source area and extent of plume(s) as defined by most recent field studies.	
DESIGNATION	*CRITERIA*	POINTS
NONE *or* NOT APPLICABLE	*Either of the Following* ➢ OHM likely attributable to the disposal site has not been identified in, and is not anticipated to be identified in, groundwater. *or* ➢ OHM has not been identified in groundwater at concentrations ≥ applicable groundwater RCs. This criteria may be met by conducting a response action, in accordance with these regulations, to reduce groundwater concentrations.	0
EVIDENCE OF CONTAMINATION (Assumes No Exposure Pathway)	*Any of the Following* ➢ A release of OHM to groundwater has been identified but no laboratory analysis has been conducted. *or* ➢ A non-aqueous phase liquid (NAPL) has been identified in or on the groundwater. *or* ➢ OHM has been identified in groundwater at concentrations ≥ applicable groundwater RCs.	20
POTENTIAL EXPOSURE PATHWAY	*Either of the Following* ➢ A private drinking water well is located within 500' of any portion of a disposal site where OHM has been identified in groundwater at concentrations ≥ 310 CMR 40.0974(2). *or* ➢ The disposal site is located within a Zone II or upgradient of a public well within an Interim Wellhead Protection Area *and* OHM has been identified in groundwater at concentrations ≥ 310 CMR 40.0974(2).	100
LIKELY or CONFIRMED EXPOSURE PATHWAY	*Either of the Following* ➢ OHM, possibly attributable to the disposal site, has been identified in a public or private drinking water supply well. Drinking water samples shall be taken prior to treatment or blending. *or* ➢ A reasonable likelihood exists that a public or private water supply well has been or is likely to be impacted by OHM from the disposal site.	150

GROUNDWATER DISCUSSION

Principal Focus: Under the Interim Site Classification System, the principal concern was whether conditions at the disposal site could result in the contamination of drinking water supplies. Principal considerations included:

- A hydrogeologic connection potentially exists between the groundwater containing OHM and the water supply well; and
- Migration or likely migration of OHM to the water supply well(s).

These same factors should be considered when completing the NRS.

Release of OHM: A release of OHM to the groundwater may be evident even though laboratory data is not available. For example a "sheen" on the groundwater, absent analytical data should still be considered Evidence of Contamination.

Reportable Concentrations: The criteria for determining which RCs are applicable for scoring Section II.B. are found in the MCP (310 CMR 40.0360).

NAPL: The presence of non-aqueous phase liquid (NAPL) is included as a criteria for "Evidence of Contamination" because it is an easily identifiable qualitative indicator. NAPL includes both light and dense NAPL.

Examples for scoring Groundwater.

EXAMPLE II-B-1

Scenario:	Pesticides have been stored at a disposal site in drums. There has been limited spillage of pesticides during mixing and batching operations. A RAM was conducted to remove the contaminated soils. Sampling indicated that, while pesticides were detected in groundwater at the area of highest anticipated concentrations, the levels were below the applicable RC.
Score:	0 (None or Not Applicable)
Rationale:	The criteria in 40.1512(2) provides for this score if no OHM is detected at levels exceeding appropriate RCs in groundwater.

EXAMPLE II-B-2

Scenario:	A sheen is observed in a monitoring well.
Score:	20 (Evidence of Contamination)
Rationale:	Section II.B. criteria specifically require at least a score of 20 when OHM is detected in groundwater.

EXAMPLE II-B-3

Scenario:	A dry cleaner is located approximately 500 feet upgradient of a Zone II boundary. Phase I results indicate that a plume of perchloroethylene (PCE) has migrated into the Zone II from the site. PCE concentrations within the Zone II are less than RCGW-1 standards.
Score:	NA
Rationale:	Section II.B. criteria do not require scoring exposure pathways unless the applicable groundwater RC's are exceeded.

EXAMPLE II-B-4

Scenario:	A dry cleaner is located approximately 500 feet upgradient of a Zone II boundary. Phase I results indicate that a plume of perchloroethylene (PCE) has migrated into the Zone II. PCE concentrations within the Zone II are greater than RCGW-1 standards.
Score:	100 (Potential Exposure Pathway)
Rationale:	Because RCGW-1 standards are exceeded within the Zone II, the LSP must score this condition as a potential exposure pathway.

EXAMPLE II-B-5

Scenario:	Site attributable OHM has been detected in an IWPA at concentrations greater than RCGW-1. The water board has confirmed that the well has not been affected by site contaminants.
Score:	100 (Potential Exposure Pathway)
Rationale:	Section II.B. criteria require this score when concentrations exceed RCGW-1 in an IWPA or Zone II. If the well had been or was expected to be affected, a score of 150 points would be appropriate.

EXAMPLE II-B-6

Scenario:	Site-attributable OHM has been detected in a private drinking water well.
Score:	150 (Likely or Confirmed Exposure Pathway)
Rationale:	Section II.B. requires a score of 150 whenever OHM is detected in a private or public well.

EXAMPLE II-B-7

Scenario: A site has a number of houses less than 90 feet from the OHM. All homes in the community are served by a public water supply. Information provided by the Board of Health, local water supplier, and the Department of Public Works (and documented in the Phase I) does not indicate that none of these homes have private drinking water wells.

Score: 20 (Evidence of Contamination)

Rationale: In general, private drinking water well locations may be determined through consultation with relevant local authorities. Also, an effort to perform a door to door survey in the area should be made, as private wells are often not well documented. In this case there is no evidence of a potential exposure pathway as no private wells are identified.

EXAMPLE II-B-8

Scenario: A manufacturing facility has a private well used for non-contact cooling water. The well is also attached to drinking water fountains in the facility, although employees have stated that the connections to the "bubblers" have been turned off. OHM has been detected in site groundwater.

Score: 100 (Potential Exposure Pathway)

Rationale: In general, whenever there has been or is a cross-connection between process and drinking waters, even if the drinking connections are not in current use, they should be scored as Potential Exposure Pathway. Only if the piping/connection has been removed or permanently disabled could there be cause to score only for Evidence of Contamination. Documentation such as a cross-connection inspection, under 310 CMR 22.22 could be considered sufficient evidence, in this case, of no cross-connection.

EXAMPLE II-B-9

Scenario: A release from an Underground Storage Tank has resulted in a plume that has commingled with a plume attributable to an off property source.

Score: 20 (Evidence of Contamination)

Rationale: Commingled plumes strongly suggests that a complex remedial response will be required.

II.C. SURFACE WATER 40.1512(3)

II.C.	SURFACE WATER EXPOSURE CRITERIA	
DEFINITION	As defined by 310 CMR 40.0006, including rivers, streams, lakes, ponds, springs, impoundments, estuaries, wetlands, coastal waters and vernal pools.	
DESIGNATION	*CRITERIA*	POINTS
NONE *or* NOT APPLICABLE	➢ OHM likely attributable to the disposal site has not been identified in, and is not anticipated to be identified in, surface waters.	0
EVIDENCE OF CONTAMINATION (Assumes No Exposure Pathway)	*Any of the Following* ➢ A release (past or on-going) of OHM to surface water has been identified. *or* ➢ Qualitative evidence of a release. • OHM-attributable visible sheen or discoloration; *or* • OHM entering surface water; *or* • OHM-attributable stained soils in contact with surface water; *or* • There is a reasonable likelihood that OHM *will* be identified in surface water as a result of OHM migration. *or* ➢ OHM, likely attributable to the disposal site, has been identified in groundwater at concentrations that are likely to result in detectable concentrations in surface water.	20
POTENTIAL EXPOSURE PATHWAY	*Either of the Following* ➢ OHM, likely to be attributable to the disposal site, has been identified in a surface water known to be used for drinking, swimming, boating or fishing. *or* ➢ OHM, likely to be attributable to the disposal site, has been identified at concentrations ≥ Ambient Water Quality Criteria (AWQC) pursuant to 40.1505(2) and 40.1516(1).	100
LIKELY or CONFIRMED EXPOSURE PATHWAY	*Any of the Following* ➢ There is a reasonable likelihood that a surface public drinking water supply has been or may be impacted by OHM from the disposal site. *or* ➢ OHM, possibly attributable to the disposal site, has been identified at the entry point to a public drinking water supply distribution system. *or* ➢ A fish advisory likely attributable to the disposal site is in effect. *or* ➢ OHM likely attributable to the disposal site are present and has been identified at concentrations ≥ Ambient Water Quality Criteria (AWQC) pursuant to 40.1505(2) and 40.1516(1), and the disposal site is located in or contains: an Area of Critical Environmental Concern (ACEC); a mapped habitat of a Species of Special Concern, Endangered or Threatened Species; a Certified Vernal Pool; a Restricted Wetland; an Outstanding Resource Water; a fish habitat; or a Protected Open Space.	150

SURFACE WATER DISCUSSION

Principal Focus: In the past, DEP has classified a site as a Priority site if: (1) concentrations of site-attributable OHM in surface drinking water supplies exceed or are likely to exceed MCLs; or (2) where Ambient Water Quality Criteria (AWQC) have been exceeded. In the NRS, DEP's principal concerns with surface water are expanded to include the protection of recreational waters and aquatic habitats.

Sediments: Sediment contamination is evaluated in Section II.A. (Soil). In the event that site-attributable OHM is present in both sediments and surface water, both Section II.A. and II.C. (Surface Water) should be scored.

Ambient Water Quality Criteria: AWQC are included as scoring criteria in this. In general, score II.C. based on freshwater or marine (as appropriate) *chronic* AWQC concentrations. If no chronic AWQC exists for a site contaminant, the acute AWQC should be used. Where, in a marine situation, no marine AWQC exist, use fresh water AWQC, and conversely use the marine AWQC for a freshwater environment if no freshwater value exists. When no AWQC exist for a significant disposal site contaminant, the LSP may choose to apply an AWQC assigned to a contaminant of similar environmental toxicity. Information about AWQC is available online at www.epa.gov/ost/pctoc.html.

Sensitive Environments: Section II.C. criteria refer to the following sensitive environmental areas: Areas of Critical Environmental Concern, endangered species habitat, Certified Vernal Pools, Restricted Wetlands, Outstanding Resource Waters, fish habitat, and Protected Open Space. Definitions of these areas are provided in Section V. of this Guidance Manual.

Wetlands: Two general categories of wetlands are considered in Section II.C. For Evidence of Contamination or Potential Exposure Pathway, the presence of all wetlands as defined by 310 CMR 40.0006 must be considered. This includes all wetlands subject to protection under the Wetlands Protection Act (M.G.L. Chapter 131, Section 40), the Wetland Protection Regulations (310 CMR 10.00), the regulations promulgated under the Massachusetts Clean Water Act (314 CMR 9.00), and Section 401 of the federal Water Pollution Control Act (33 U.S.C. 1341, as amended). For evaluating Likely or Confirmed Exposure, only the presence of a Restricted Wetland (M.G.L. Chapter 131, Section 40A) need be considered. Lists of Restricted Wetlands, by municipality, are available from DEP's Conservancy Program (Wetlands Division) in Boston.

Groundwater Discharge: Contaminated groundwater discharges to surface water should be evaluated for both groundwater and surface water contamination.

Examples for scoring Surface Water:

EXAMPLE II-C-1

Scenario:	The site abuts a river that passes through several industrial areas upstream of the disposal site. Groundwater flow is believed to be towards the river. OHM similar to that found at the site are detectable in the river. Upstream sampling results showed similar concentrations of the same contaminants.
Score:	20 (Evidence of Contamination)
Rationale:	Although upstream and downstream concentrations are not significantly different, there is evidence to show that the site may be contributing to river contamination.

EXAMPLE II-C-2

Scenario:	No surface water data is available, but groundwater data suggests that a nearby lake may be affected by detectable levels of site-attributable OHM. The lake is used for fishing, based on anecdotal evidence documented in the Phase I.
Score:	100 (Potential Exposure Pathway)
Rationale:	Section II.C. criteria require a score of 100 because "there is a reasonable likelihood that OHM will be identified in surface water as a result of OHM migration" and the lake is used for recreation.

EXAMPLE II-C-3

Scenario:	The site abuts a river where a fish advisory has been issued due to "chemical contamination." In addition to this site, there are many industrial discharges to the river, both upstream and downstream of the site, that could be cause for the issuance of the advisory.
Score:	150 (Likely or Confirmed Exposure)
Rationale:	In this situation, the advisory would be scored, unless documentation indicating that the site is not a significant contributor to the river is developed.

EXAMPLE II-C-4

Scenario:	Fuel oil from a leaking UST is leaching into a nearby lake. This lake is used by windsurfers.
Score:	100 (Potential Exposure Pathway)
Rationale:	Section II.D. requires that any recreational use of a surface water with detectable OHM be scored at least 100 points.

EXAMPLE II-C-5

Scenario:	The site abuts an inactive reservoir, used only as an emergency drinking water supply. Site-attributable OHM is detectable in surface water.
Score:	150 (Likely or Confirmed Exposure Pathway)
Rationale:	Although the reservoir is not in regular use, it is still a public drinking water source.

EXAMPLE II-C-6

Scenario:	Metals from a former plating facility are detectable in a surface water body, but not above AWQCs. The lake is used for fishing.
Score:	100 (Potential Exposure Pathway)
Rationale:	Section II.C. criteria require scoring the potential exposure pathway when site-related OHM is found in a surface water used for drinking or recreation. If the lake were used as a drinking water source or if concentrations exceed AWQCs, the site would score 150 points.

EXAMPLE II-C-7

Scenario:	PCBs are present in suspended particulates in an estuary. Although a fish advisory has been issued for this estuary, the estuary is used for boating and continues to be used for some fishing.
Score:	150 (Likely or Confirmed Exposure Pathway)
Rationale:	The recreational fishing alone would score 100 points. The fish advisory results in the higher 150 point score. If the advisory were not associated with the site, and the OHM concentrations were less than AWQC, the site would score 100 points.

EXAMPLE II-C-8

Scenario:	Site-attributable OHM has been detected in an on-site certified vernal pool at concentrations less than the chronic freshwater AWQC
Score:	20 (Evidence of Contamination)
Rationale:	Only if AWQC are exceeded would the site merit a score of 150 points.

EXAMPLE II-C-9

Scenario:	Site-attributable OHM has been detected in an on-site wetland at concentrations greater than the chronic freshwater AWQC.
Score:	100 (Likely or Confirmed Exposure Pathway)
Rationale:	Because OHM levels exceed AWQC, a score of 100 points must be assigned. If the wetland is a "restricted wetland" or a fish habitat, the score would be 150 points.

EXAMPLE II-C-10

Scenario:	There is breakout of OHM into a shallow marshy wetland as evidenced by a sheen on the water surface. The wetlands are not mapped in GIS, but qualify as a wetlands pursuant to the Wetlands Protection Act. Small fish can be seen in the water.
Score:	20 (Evidence of Contamination)
Rationale:	The 20 point score is appropriate only if AWQC are not exceeded. If AWQC are exceeded, the presence of a fish habitat would require a score of 150 points.

EXAMPLE II-C-11

Scenario:	The site does not abut a surface water body. However, a release of OHM to a nearby pond, via a storm drain, has been identified. No surface water samples have been collected, but the pond is used for recreation.
Score:	100 (Potential Exposure Pathway)
Rationale:	The OHM is attributable to the site. The proximity of the source to the pond is not relevant in this case.

II.D. AIR 40.1512(4)

II.D.	**AIR EXPOSURE CRITERIA**	
DEFINITION	Air contamination includes both vapors, particularly focusing on indoor air, and particulates. Score only releases regulated under C. 21E; do not score permitted releases associated with on-going commercial or industrial processes.	
DESIGNATION	*CRITERIA*	POINTS
NONE *or* NOT APPLICABLE	➢ OHM likely attributable to the disposal site has not been identified in, and is not anticipated to be identified in, air.	0
EVIDENCE OF CONTAMINATION (Assumes No Exposure Pathway)	*Any of the following* ➢ A release, or potential release, of OHM to air has been identified. *or* ➢ OHM that may be released to air as particulate material has been identified in the top 6" of the ground surface. Unbroken paved/concrete slab surfaces *may* be interpreted as preventing release of particulates to air. *or* ➢ OHM that may be released to air as a vapor has been identified in an open container or surface impoundment that is part of the disposal site. *or* ➢ An odor that is reasonably attributable to a release of OHM at the disposal site has been identified.	15
POTENTIAL EXPOSURE PATHWAY	*Any of the Following* ➢ OHM releases, likely attributable the disposal site, have been repeatedly identified in ambient air within 100' of a residence, school, hospital, nursing home, or playground when such releases are above ambient background concentrations and are not related to permitted releases. *or* ➢ Total volatile organic compounds have been identified in groundwater at concentrations ≥ 5 mg/l within 30 feet of a school or occupied residence where the depth to groundwater is ≤ 15 feet. Soil gas surveys or indoor air sampling may be conducted to demonstrate no exposure to OHM. *or* ➢ A reasonable likelihood exists that the indoor air quality of an occupied building *will be* impacted by OHM likely attributable to the disposal site.	100
LIKELY or CONFIRMED EXPOSURE PATHWAY	*Either of the Following* ➢ OHM has been identified in indoor air in an occupied building, above background concentrations, when the OHM is likely attributable to a non-permitted release at the disposal site. *or* ➢ A reasonable likelihood exists that OHM likely attributable to the disposal site *is* affecting air quality in an occupied building.	200

AIR DISCUSSION

Principal Focus: DEP's principal concern with OHM in air is whether air emission (particulates or vapors) at or from the disposal site could adversely impact human or environmental receptors.

Sampling: While air is included as an exposure pathway, DEP anticipates that most disposal sites will not require air sampling as part of the Phase I investigation.

Determining Background: Background levels may vary considerably. Accordingly, the NRS does not establish background levels for use in Section II.E. Site-specific background levels may be measured using appropriate and accepted methods or taken from literature citations when establishing indoor air background. For ambient air, the NRS is only concerned with contamination resulting from release at a disposal site, not other ambient conditions, such as permitted releases from an industrial facility or ambient conditions related to the operation of a gasoline station.

Surficial Soil Contamination: The NRS requires scoring "Evidence of Contamination" if OHM is present in the top 6 inches of the ground surface. This criteria is intended to address air particulates. Soil coverings often significantly reduce the possibility of particulate emissions. On a site-specific basis, unbroken pavement and concrete may be interpreted as preventing release of particulates to air. Most paved or concrete surfaces have cracks, and most sites are not completely paved. Professional judgment should be used in determining potential air impacts. For example, on many sites, the areas above USTs may be paved, but this area may be surrounded by grass. Crushed stone or grass may substantially prevent emissions of particulates. In all cases, surface cover should be considered in evaluating the potential for inhalation of particulates.

Permitted Discharges: The NRS requires scoring "Potential Exposure Pathway" and "Likely or Confirmed Exposure Pathway", based on OHM concentrations, that are not related to permitted discharges. Many disposal sites are near active manufacturing/commercial facilities which have air discharges regulated by DEP. The NRS is only concerned with discharges that are related to the disposal site. For example, if benzene is the only contaminant measured in the air at a disposal site with concentrations typical of an operating gasoline station and not related to a gasoline release requiring MCP notification, air should not be scored.

VOCs in Groundwater: The NRS requires scoring "Potential Exposure Pathway" if total volatile organic compounds in groundwater are $\geq$ 5 mg/l within 30 feet laterally and 15 feet vertically of a school or occupied residence. This criteria allows for scoring of indoor air without requiring indoor air sampling. If a soil gas survey is conducted which determines that soil gases are not contaminated by OHM, or if indoor air is sampled in the nearby buildings and no evidence of indoor air contamination is detected, Potential Exposure Pathway would not be scored.

Occupied Building: The NRS requires certain scores for air when the release is in proximity to an "occupied" building or when indoor air in an occupied building may be affected. For purposes of the NRS, an occupied building should be considered any building where persons work, sleep, or otherwise regularly use. For example, a warehouse that is visited only on a weekly basis is considered occupied. LSPs should also consider whether "abandoned" buildings are serving as shelter for homeless persons on a regular basis. Situations such as this, regardless of the legality of the occupancy, should be considered occupied.

Examples for scoring Air:

EXAMPLE II-D-1

Scenario:	A leaking fuel oil UST is located adjacent to a house. Residents have complained of oily odors in the basement.
Score:	200 (Likely Confirmed Exposure Pathway)
Rationale:	Section II.D. criteria require scoring 200 points where indoor air has been affected in an occupied building.

EXAMPLE II-D-2

Scenario:	Organic vapors were detected in the basement of a residence. A sub-slab de-pressurization system has been installed and air quality in the basement has been restored to acceptable levels.
Score:	15 (Evidence of Contamination)
Rationale:	Although the IRA is addressing current releases to indoor air, the criteria for "None or Not Applicable" are not met. Further, the source has not been removed and the potential for recurring releases, should the system be disabled, remains.

EXAMPLE II-D-3

Scenario:	A leaking UST was removed from a commercial site. During removal, headspace analysis indicated soil contamination. Laboratory analysis confirmed TPH concentrations that precluded on-site re-use of the excavated soil. The resulting soil pile has not been removed from the site, and there is evidence that children have been playing and digging in the soil. The site is greater than 100 feet from any residence, school, or playground.
Score:	15 (Evidence of Contamination)
Rationale:	This scenario is described in the soil section (II.A.) and scores 150 points for soil. This scenario also raises questions about inhalation of particulates and/or VOCs. The Section II.D. criteria requires an air score of at least 15 points for evidence of contamination (OHM in surficial soils that may be released to air as particulates). *Risk reduction through removal of the soil pile (prior to Classification) would eliminate both soil and air exposure scores.*

EXAMPLE II-D-4

Scenario:	Site contaminants are detected above background levels expected in indoor air.
Score:	200 (Likely or Confirmed Exposure Pathway)
Rationale:	Any exposure to airborne contaminants above background concentrations in indoor air is cause to score 200 points.

EXAMPLE II-D-5

Scenario:	A soil pile contaminated with fuel oil is located less than 100 feet from an apartment building. Residents of this building have frequently complained of strong oily odors emanating from the pile. In response to complaints, a PID was used to measure total VOC levels near the pile and in the apartment building. This one-time sampling event did not detect total VOCs above ambient air levels or expected indoor background levels.
Score:	100 (Potential Exposure Pathway)
Rationale:	Although the PID did not detect VOCs at the time of field sampling, Section II.D. criteria require a score of 100 when there is repeated identification of OHM releases (i.e., odor complaints) in proximity to a residence. A single sampling using a screening device is not considered adequate to disregard a potential exposure pathway.

EXAMPLE II-D-6

Scenario:	A chemical waste lagoon is located less than 100 feet from an apartment building. Residents of this building have frequently complained of strong chemical odors in their apartments, even with the windows closed.
Score:	200 (Likely or Confirmed Exposure Pathway)
Rationale:	Air criteria require scoring 200 points if site-attributable OHM is identified in indoor air in an occupied building. The criteria for indoor air exposure is not limited to air contamination from groundwater or soils.

EXAMPLE II-D-7

Scenario:	A public water supply is contaminated by gasoline from a site. The water supply agency has installed an air stripper to treat the groundwater. The air stripper does not require an Air Quality Permit, but outdoor petroleum odors have been reported by plant workers.
Score:	15 (Evidence of Contamination)
Rationale:	The presence of odors requires scoring 15 points. If odors from the stripper were detectable in the water treatment building, 200 points (Likely or Confirmed Exposure) would be scored.

II.E. OHM SOURCES *(Scoring Range: 0, 20)*

Section II.E. evaluates the presence of multiple sources of OHM. Score 25 points if the disposal site includes two sources of contamination. Score 50 points if the disposal site includes three or more sources of contamination.

NOTE: Score only current disposal site conditions. If an LRA, IRA, URAM, RAM, or other response action has been performed prior to scoring the disposal site, and the number of sources of contamination has been reduced, score only the remaining source(s). For the purpose of NRS scoring, groundwater plumes remaining after removal of the original source (e.g., leaky tank/piping, contaminated soil) should, in general, continue to be considered a discrete source.

II.E.	**OHM SOURCES**		
Number of OHM Sources	1 0	2 25	≥ 3 50

Principal Focus: In scoring Section II.E., DEP is concerned with the complexity of the remedial response required at a site. In general, similar materials located in direct proximity may be considered one source (e.g., a gasoline station with two adjacent leaking USTs, both containing gasoline). The release of two different types of OHM near each other would be multiple sources (e.g., a gasoline station with a leaking gasoline UST and a leaking waste oil UST would be two sources). A site with two fuel oil releases that are physically separate has two sources.

There are also situations where different OHM are released from the same source, i.e., a pipeline or UST used for different materials at different times. In evaluating these types of scenarios, consider whether more than one type of OHM is released, whether the OHMs are located in the same area, and whether different remedial approaches may be required. Further examples are provided below.

Examples for scoring Multiple Sources (II.E.)

EXAMPLE II-E-1

Scenario: An area of the site has elevated metals in soil. Another area of the site has chlorinated solvents in soil
Score: 25 (Two Sources)
Rationale: Two different types of contaminants are located in different areas of the site.

EXAMPLE II-E-2

Scenario: There is a soil pile resulting from a UST excavation at a site. The release has contaminated area groundwater.
Score: 25 (Two Sources)
Rationale: The groundwater plume emanating from the original UST release constitutes one source. The soil pile left on the site is a second continuing source of OHM. Removal of the pile, under Subpart D of the MCP, prior to classification would result in a score of 0 (One Source) for the groundwater plume.

EXAMPLE II-E-3

Scenario: The site consists of a release to soil from an industrial process lagoon and a release from an UST.
Score: 25 (Two Sources)
Rationale: Each release constitutes a discrete source, potentially requiring a different remedial response.

EXAMPLE II-E-4

Scenario: A print shop has disposed of a mixture of used inks, dyes, and cleaning solvents in a shallow pit behind the facility. A slug of highly mobile organic compounds have migrated from the pit. Residual metals and less mobile organics have been found in the pit area soils.
Score: 25 (Two Sources)
Rationale: Although OHM was initially released at one location, two very different classes of contaminants have been released, and the migration of the mobile organics has resulted in a site containing two separate areas of contamination, each requiring a separate remedial response.

EXAMPLE II-E-5

Scenario: The site consists of a release from two USTs located next to each other. One contained leaded gasoline and the other, unleaded gasoline. There is no groundwater contamination.
Score: 0 (One Source)
Rationale: One remedial response is anticipated to address both releases. The two tanks are in the same location and have released very similar OHMs.

EXAMPLE II-E-6

Scenario: Releases from two USTs, one containing virgin petroleum product (located adjacent to the pumps) and one containing waste oil (located below a service bay) have occurred.
Score: 25 (Two Sources)
Rationale: Separate remedial actions may be required for the two releases. The location and type of OHMs are sufficiently distinct to require scoring two sources.

EXAMPLE II-E-7

Scenario: There are releases from three USTs, all containing the same OHM. The USTs are sufficiently far apart that three discrete plumes have been identified.
Score: 50 (Three Sources)
Rationale: Although the same OHM is common to all the releases, the presence of discrete plumes may require separate remedial responses.

EXAMPLE II-E-8

Scenario: A leaking UST has been used for different chemicals and compounds at different times. The release from the one tank over a period of time has resulted in a DNAPL layer and a separate LNAPL layer.
Score: 25 (Two Sources)
Rationale: While there is one locational source, the nature of the releases have resulted in conditions that will require a complex cleanup; addressing the floating and sinking NAPL layers. Accordingly, this situation should be scored as two sources.

EXAMPLE II-E-9

Scenario: Soil samples taken as part of a property transfer revealed elevated PAH levels throughout the property. No source was identifiable.
Score: 0 (One Source)
Rationale: Without a known source, and with one "type" of OHM present, there is no compelling evidence to score multiple sources.

EXAMPLE II-E-10

Scenario: The site is an automobile junkyard. Petroleum products, PCBs, metals, and other contaminants are found in both soil and groundwater throughout the property.
Score: 50 (Three or More Sources)
Rationale: The nature of a junkyard, with multiple releases of different contaminants at different locations, suggests several sources which complicate the remedial options.

III. DISPOSAL SITE CHARACTERISTICS

(Scoring Range: 3 - 180) (III.A. + III.B. + III.C. + III.D.)

Section III evaluates the disposal site on the basis of: the type(s) of contaminant released to the environment; the human health-based toxicity of the contaminant(s); the concentrations of the contaminant(s) in the environment; contaminant mobility and persistence; and disposal site hydrogeology.

III.A. OHM TOXICITY SCORE *(Scoring Range: 1 - 80)*

The OHM Toxicity Score is derived from the Human Health-Based Toxicity Value of each contaminant and its highest detected concentrations using Table III.A. and/or Worksheet III.A.1. Section III. requires knowledge of the specific disposal site contaminants and the concentrations of each contaminant in each media. Data must be derived from laboratory analysis in accordance with 310 CMR 40.0017 and correspond with the data in the Phase I or other report. Values for groundwater and surface water must be reported in micrograms per liter (µg/l); values for soil contamination must be in micrograms per gram (µg/g) dry weight.

Principal Focus: DEP's focus for Section III. is to consider those contaminants present at a site which pose the greatest "threat" due to their toxicity and concentrations in the environment. Where there are mixtures of contaminants, the representation of the OHM constituents of the mixture should be representative of the actual site conditions.

III.A.	**OHM TOXICITY SCORE** *Highest OHM Toxicity Score* *From Table III.A. or Worksheet III.A.1. on Following Pages.*
OHM Scored: _____ Concentration and Media: _____	Toxicity Score (1 - 80) _____

TABLE III.A. The OHM Toxicity Score is derived in four steps:

(1) Identify disposal site contaminants;
(2) Note the *highest* detected concentration of each contaminant in soil and groundwater or surface water;
(3) Correlate each contaminant with its *highest* detected concentration and circle the appropriate value (1 - 80) in Table III.A.;
(4) Choose the *highest* derived score and enter it together with the name of the contaminant in Section III.A.

In scoring Section III.A. and III.A.1., assign only the *single* highest score resulting from an examination of all disposal site contaminants. *Do not add the scores*; the impact of multiple contaminants is considered in Section

III.B. In determining the "highest detected concentration," **do not average the contaminant concentrations**. "Hot Spot" concentrations must be included in determining the highest detected concentrations.

The OHM Toxicity Score for contaminants not found in Table III.A. may be determined by using Worksheet III.A.1. and 310 CMR 40.1513 (Human Health-Based Toxicity Values). 40.1513 provides DEP-assigned Human Health Based Toxicity Values for approximately 450 potential contaminants. This matrix, developed by DEP's Office of Research and Standards (ORS) assigns a value between 1 and 50 based on the oral reference dose (RfD) and carcinogenicity class. This list will be regularly updated by ORS; revised tables will be provided to LSPs as they become available. As in III.A., these Toxicity Values are correlated on the scoresheet with each contaminant's highest detected concentration to derive the OHM Toxicity Score (see Notes, below).

NOTES:

1) If an IRA, LRA, RAM, URAM or other MCP response action has been conducted at the disposal site prior to classification, score the remaining (current) contaminants and corresponding concentrations which have been documented in the Phase I or other report.

2) Section III. requires consideration of all contaminants at a disposal site. DEP anticipates, however, that at some disposal sites, for example, those with numerous contaminants at low concentrations and a limited number of contaminants at relatively higher concentrations (such as an older industrial site) it may be possible and reasonable to determine the appropriate Section III.A. and III.B. scores without developing the OHM Toxicity Score for every contaminant.

3) Multiple sampling rounds: Professional judgment should be exercised when evaluating data from multiple sampling rounds and scoring should be based on those results that provide an accurate assessment of disposal site conditions. For example, historic high volatile concentrations would not represent site conditions if volatilization has resulted in lower VOC concentrations. The concentrations and OHMs yielding the highest toxicity score from sampling rounds representative of current site conditions must, however, be used. If a response action has been completed, the highest score from sampling rounds taken after the action is complete may be used.

4) Anomalous results: Professional judgment should be exercised in determining which sampling results to apply toward scoring. Anomalous results may be disregarded for purposes of § III if the results do not accurately reflect disposal site conditions and if this discrepancy is documented in the Phase I or other report.

Table III.A.	**OHM TOXICITY SCORE**						
OHM	***CONCENTRATION*** (soil/sediment: µg/g; surface/groundwater µg/l)						
	≤ 99	100 - 999	1,000 - 9,999	10,000 - 100,000	> 100,000 NAPL < 0.5"	NAPL 0.5" - 12"	NAPL > 12"
Arsenic	20	30	40	50	60		
Benzene	15	25	35	45	55	65	75
Bis(2-ethylhexyl)phthalate	10	20	30	40	50	60	70
Cadmium	10	20	30	40	50		
Carbon Tetrachloride	20	30	40	50	60	70	80
Chlorobenzene	5	15	25	35	45	55	65
Chromium III	1	10	20	30	40		
Chromium VI	10	20	30	40	50		
Coal Tar	5	15	25	35	45	55	65
Cyanide	5	15	25	35	45		
1,1 Dichloroethane	10	20	30	40	50	60	70
1,2 Dichloroethane	10	20	30	40	50	60	70
Ethylbenzene	5	15	25	35	45	55	65
Ethylene Dibromide	20	30	40	50	60	70	80
#2 Fuel Oil (virgin product)	5	15	25	35	45	55	65
Gasoline (virgin product)	10	20	30	40	50	60	70
Lead	20	30	40	50	60		
Mercury	20	30	40	50	60	70	80
Methylene Chloride	10	20	30	40	50	60	70
Methyl Ethyl Ketone	5	15	25	35	45	55	65
Methyl Tert Butyl Ether	10	20	30	40	50	60	70
Nickel	5	15	25	35	45		
Phenol	1	10	20	30	40	50	60
PAHs	10	20	30	40	50	60	70
PCBs	20	30	40	50	60	70	80
Tetrachloroethylene	10	20	30	40	50	60	70
Toluene	1	10	20	30	40	50	60
1,1,1 Trichloroethane	5	15	25	35	45	55	65
Trichloroethylene	15	25	35	45	55	65	75
Vinyl Chloride	15	25	35	45	55	65	75
Xylenes	1	10	20	30	40	50	60
Zinc	1	10	20	30	40		

As noted above, Worksheet III.A.1. is used to determine the OHM Toxicity Scores for contaminants not found in Table III.A.

Use Worksheet III.A.1. to determine the OHM Toxicity Score for OHM not listed in Table III.A.
See 40.1513 for Human Health-Based Toxicity Values for each OHM.

Worksheet III.A.1	**OHM TOXICITY SCORE**						
HUMAN HEALTH-BASED TOXICITY VALUE	*CONCENTRATION* Use µg/g for Soil and µg/l for Surface Water and Groundwater						
	≤ 99	100 - 999	1,000 - 9,999	10,000 - 100,000	> 100,000 NAPL < 0.5"	NAPL 0.5" - 12"	NAPL > 12"
< 5	1	10	20	30	40	50	60
5 - 19	5	15	25	35	45	55	65
20 - 29	10	20	30	40	50	60	70
30 - 39	15	25	35	45	55	65	75
40 - 50	20	30	40	50	60	70	80

III.A.1.	*OHM and Concentrations Used in Section III.A.1.*			
OHM	Human Health-Based Toxicity Value	Concentration (Soil - µg/g)	Concentration (Water - µg/l)	**OHM Toxicity Score**
		Scoresheet Contains Additional Space		

OHM TOXICITY SCORE DISCUSSION

Non-Aqueous Phase Liquids (NAPL): The presence of NAPL is considered a significant factor in the potential risks associated with a disposal site and the feasibility of achieving an RAO determination. When NAPL is present, score the disposal site based on the major constituents of the NAPL (see defaults above) and the thickness of the layer. The LSP should score NAPL thickness according to conditions believed to be present in the media; this may not exactly reflect thicknesses observed in monitoring wells.

Petroleum Releases: Because petroleum products contain a number of constituents, DEP has developed a weighted Human Health-Based Toxicity Value for these mixtures.

Fuel Oil: The OHM Toxicity Score is derived using non-aqueous phase liquids (NAPL) thickness or, if NAPL is not present, total petroleum hydrocarbon (TPH) concentrations. Score releases of virgin fuel oil *unless* analytical data on the most toxic individual constituents indicates a higher OHM Toxicity Score.

Gasoline: The OHM Toxicity Score is derived using NAPL thickness or, if NAPL is not present, use Gasoline values in Table III.A based on total BTEX (benzene, toluene, ethylbenzene, and xylene) concentrations. Use Table III.A. to score releases of virgin product unless analytical data on the most toxic individual constituents indicates a higher OHM Toxicity Score.

Coal Tar Disposal Sites: Total polycyclic aromatic hydrocarbons (PAHs) concentrations may be used to derive the OHM Toxicity Score at coal tar disposal sites. If coal tar constituents are PAHs, score the highest PAH concentration or the coal tar score, whichever results in the highest toxicity score.

Examples for Scoring III.A. OHM Toxicity Score

EXAMPLE III-A-1

Scenario:	A release of virgin gasoline has resulted in groundwater contamination. The highest concentration of total BTEX at the site is 1300 µg/l.
Score:	30
Rationale:	The score was developed based on total BTEX using Table III.A.

EXAMPLE III-A-2

Scenario:	A release of gasoline has occurred at a site. The gasoline (total BTEX) scored higher than any of the individual constituents. The analysis of the BTEX indicates that the "driving force" is the concentration of xylenes; benzene represents a very small percentage of this mixture and results in a lower toxicity score than xylene.
Score:	Score gasoline (total BTEX)
Rationale:	Scoring the default here would indicate the highest toxicity as a generally conservative approach to the site. Since the individual constituent analysis was available at this site, this Section could be modified in Section VI by subtracting points if the Phase I Report clearly documents that only virgin petroleum was released at the site, and the highest toxicity score of the constituents, in this case xylene, is more truly representative of site conditions.

EXAMPLE III-A-3

Scenario:	A site shows soil concentrations of 500 ug/g Dimethyl-amine.
Score:	20
Rationale:	Dimethyl-amine is not found in Table III.A.. The table at 310 CMR 40.1513(2) entitled Human Health Based Toxicity Values and Scores must be consulted to determine the score of this chemical.

EXAMPLE III-A-4

*Scenario:*Disposal site concentrations and OHM for hypothetical site X are listed below.

DISPOSAL SITE 'X' CONTAMINANTS	Human Health-Based Toxicity Value	Concentration (soil)	OHM Toxicity Score
Bis(2-ethylhexyl)phthalate	**22**	500 µg/g	**20**
Carbon Tetrachloride	**43**	101 µg/g	**30**
Dimethyl-amine	**25**	500 µg/g	**20**

Score: 30

Rationale: While the concentrations of Bis(2-ethylhexl)phthalate and Dimethyl-amine are higher than that of Carbon Tetrachloride, the greater toxicity value of carbon tetrachloride results in the highest OHM toxicity score.

EXAMPLE III-A-5

Scenario: A NAPL layer with a thickness greater than one foot has been found at a site. Fingerprinting of the NAPL indicates that it is predominantly a #2 fuel oil, although PCBs are also present in low concentrations. The scoresheet results in a lower toxicity score for PCBs than for fuel oil.

Score: 65 points for fuel oil NAPL > 12" thickness; add points in § VI.

Rationale: This situation calls for discretion in determining an appropriate OHM Toxicity Score. The NAPL would score 65 points if it was a virgin product. The presence of the PCBs, however, indicates that this oil is not virgin, and that the NAPL is *more* toxic than virgin fuel oil. While it would not be reasonable to score NAPL as PCBs, points should be added in Section VI. to reflect the presence of the PCBs.

EXAMPLE III-A-6

Scenario: Samples collected for a property transaction at an urban site indicated contamination (TPH at 7500 µg/g and lead at 3,000 µg/g). The source has not been identified in the Phase I. This may be a case of "downtown brown."

Score: 40 (Lead)

Rationale: TPH as fuel oil results in a Toxicity Score of 25. Scored as gasoline, the TPH yielded a score of 30. Lead scores 40. Because both of the sources are unknown, the lead is used to score the site due to its higher score

EXAMPLE III-A-7

Scenario:	A leaking UST containing unleaded gasoline was present at an urban site. After removal of the UST concentrations of gasoline as total BTEX in the soil are 500 ug/g and lead concentrations are at 1,200 ug/g.
Score:	40 (Lead)
Rationale:	Although Lead was detected and yielded the highest score (based on Phase I information), points could be subtracted in Section 6 if the scorer believes that the lead is "Background" as per the definition in 310 CMR 40.0006.

EXAMPLE III-A-8

Scenario:	A leaking fuel oil UST was present at the site. However, Phase I analysis of the release indicates that the highest toxicity scores appear unrelated to the release, but rather from some other source such as PCE from a nearby dry cleaner.
Score:	The highest resulting OHM Toxicity Score
Rationale:	In scoring Section III, the source of the OHM is not relevant due to uncertainties at the Phase I stage of assessment. If the PCE source is upgradient from the disposal site, points could be subtracted in Section VI and documented in a Downgradient Property Status submittal.

III.B. MULTIPLE OHMs *(Scoring Range: 0, 30)*

Section III.B. considers whether the disposal site contains more than one contaminant with a OHM Toxicity Score of ≥ 30. If more than one contaminant has a OHM Toxicity Score ≥ 30, score 30 points.

III.B.	**MULTIPLE OHMs**	
More Than One OHM With an OHM Toxicity Score of ≥ 30	No	Yes
	0	30

Virgin Petroleum Product

Releases of virgin petroleum products should be scored as a release of multiple compounds if the site was scored using total BTEX or TPH in Section III.A. and that score was greater than 30. Virgin petroleum releases may be scored based on individual constituents only if Section III.A. has been so scored.

Examples for scoring Multiple OHMs.

EXAMPLE III-B-1

Scenario: The site contains a release of #2 fuel oil at 1500 µg/g, resulting in an OHM Toxicity Score of 25.
Score: 0
Rationale: The Score of 25 is below the Virgin Petroleum Product Default of 30. Therefore, according to the decision rule, no score needs to be assigned for Multiple OHMs.

EXAMPLE III-B-2

Scenario: A release of gasoline from a gasoline station with an unclear history yielded Phase I data, of 900 µg/g BTEX, 120 µg/g lead, and 200 µg/g EDB.
Score: 30
Rationale: Both lead and EDB concentrations result in OHM Toxicity Scores of ≥ 30. Therefore, the site should score 30 points for Multiple OHMs.

EXAMPLE III-B-3

Scenario:	A release of gasoline resulted in BTEX concentrations in groundwater of 50,000 µg/l, resulting in a default OHM Toxicity score of 40.
Score:	30
Rationale:	The concentrations of total BTEX suggest that constituent concentrations would yield at least two individual OHM Toxicity Scores greater than 30. Alternatively, the LSP can score individual constituents to determine a more accurate breakdown of constituent concentrations.

EXAMPLE III-B-4

Scenario:	The site has a mixed fuel oil/PCB NAPL. The Section III.A. score was 40.
Score:	30 (Multiple OHMs)
Rationale:	The fuel oil score alone would be sufficient to score this Section at 30 points. The additional uncertainty of the PCBs at an unknown percentile of the mixture suggests a conservative approach to scoring this situation.

III.C. OHM MOBILITY AND PERSISTENCE *(Scoring Range: 0 - 50 Points)*

Section III.C. ranks the mobility and persistence of organic contaminants based on vapor pressure (mm Hg), solubility (mg/l), octanol/water partition coefficient (K_{ow}), degradation potential, and specific gravity. Metals are evaluated according to solubility. 410 CMR 40.1514 (Mobility & Persistence Values) provides this information and the assigned mobility and persistence score for 50 commonly occurring organic contaminants and 13 priority pollutant metals. The factors, and ranges used to derive a value of 0, 5, or 10 points for each factor, are shown in the matrix ("OHM Mobility and Persistence Factors") below. The sum of these five values form the OHM Mobility and Persistence Score (0 - 50). Contaminants not found in 40.1514 should be assigned a mobility and persistence score as shown in the example following the matrix.

For Section III.C., score all contaminants assigned an OHM Toxicity Score in Section III.A. ≥ 20. If no OHM score ≥ 20, score all OHM scoring ≥ 10. If no OHM scored greater than 10, score all site OHM. Assign the highest resulting mobility and persistence value regardless of which contaminant was used to score Section III.A.

NOTE: DEP recognizes that at some disposal sites it may be possible and reasonable to determine the appropriate Section III.C. score without evaluating every contaminant. With experience in completing the NRS, the correct Mobility and Persistence score may be derived by considering only the contaminants with the highest concentrations and NRS assigned toxicities.

Mobility and Persistence Defaults
Virgin Fuel Oil: 20 points.
Gasoline: 25 points.

III.C.	**OHM MOBILITY and PERSISTENCE** *Score according to 40.1514 - OHM Mobility and Persistence*	
OHM Scored: _____		Score (0 - 50) _____

III.C.	**OHM MOBILITY and PERSISTENCE FACTORS** Volatile Organic Compounds					
FACTOR	*RANGE and VALUE (#)*					
	LOW		MEDIUM		HIGH	
Solubility (mg/L)	< 1	**(0)**	1 - 1,000	**(5)**	> 1,000	**(10)**
Vapor Pressure (mm Hg)	< 0.01	**(0)**	0.01 - 1	**(5)**	> 1	**(10)**
K_{ow}	> 10,000	**(0)**	10 - 10,000	**(5)**	< 10	**(10)**
Degradation Potential	Non-Persistent (NP)	**(0)**			Persistent (P)	**(10)**
Specific Gravity (20° C)	< 1	**(0)**			> 1	**(10)**

References used to derive mobility and persistence values for individual contaminants are found in 310 CMR 4.01514. For scoring sites with OHM other than those listed in 40.1514, use the references listed to develop values for additional contaminants. If alternative sources are used, these should be noted in an attachment to the Scoresheet.

*** ***EXAMPLE*** ***

Contaminant	*Mobility and Persistence Factors and Individual OHM Values*					
	Solubility (mg/l)	*Vapor Pressure (mm Hg)*	*K_{ow}*	*Degradation Potential*	*Specific Gravity (at 20°)*[A]	*Total Score*
Benzene	*1.8E+03 10*	*9.52E+01 10*	*1.3E+02 5*	*N-P 0*	*.879 0*	***25***
Methyl Ethyl Ketone	*2.7E+05 10*	*7.75E+01 10*	*1.8E+00 10*	*N-P 0*	*.805 0*	***30***
Trichloroethylene (TCE)	*1.1E+03 10*	*5.79E+01 10*	*2.4E+02 5*	*P 10*	*1.466 (20°/20°) 10*	***45***

Examples for Scoring OHM Mobility and Persistence

EXAMPLE III-C-1

Scenario: Concentrations for several metals are sufficiently high that the OHM Toxicity Score for at least one metal exceeds 20. These concentrations were detected in groundwater from a fractured black shale bedrock, where reducing conditions may affect metal mobility and persistence.

Score: 20 (Score the metal using the Mobility and Persistence Score listed in 40.1514.)

Rationale: Given the level of information available about site conditions in the Phase I, the highest Mobility and Persistence Score for those contaminants with a Toxicity Score above 20 must be used. The score may be amended in Section VI.

EXAMPLE III-C-2

Scenario: The site has the following OHM.

OHM	**CONCENTRATION** (µg/l)	**OHM TOXICITY SCORE**	**MOBILITY SCORE**
Benzene	40	15	25
Methyl Ethyl Ketone	200	25	30
Trichloroethylene (TCE)	50	15	45

Score: 30

Rationale: Only MEK has an OHM Toxicity Score ≥ 20. Accordingly, only MEK is considered in scoring Mobility and Persistence. If MEK were not present at this site, all OHM with a toxicity score ≥ 10 would be considered; the score in this latter scenario would be 45 for TCE.

III.D. DISPOSAL SITE HYDROGEOLOGY *(Scoring Range: 2 - 20)*

Section III.D. examines basic disposal site hydrogeological information (depth to groundwater and soil permeability) as an indicator of the potential for contaminant migration and groundwater contamination.

DEP's principal focus: When evaluating soil permeability, score according to site conditions most representative of where OHM is and where OHM is most likely to migrate. Preferential pathways should be considered and be reflected in either the Section III. or Section VI. score.

III.D.	**DISPOSAL SITE HYDROGEOLOGY** *Score according to 40.1515 - Soil Permeability*		
DEPTH TO GROUNDWATER (in feet)	SOIL PERMEABILITY		
	Low	Medium	High
> 25	2	4	8
10.1 - 25	4	8	12
5.1 - 10	8	12	16
0 - 5	12	16	20

Depth to Groundwater: Depth to groundwater should be based on the highest anticipated seasonal level. Do not use the average of site-wide groundwater depths.

Soil Permeability: Soil permeability should be based on soil type determined from borings where contamination has been identified; score the most permeable soil type. Instructions for determining soil permeability are provided in 310 CMR 40.1515, as shown below.

SOIL PERMEABILITY	
VALUES	*CRITERIA*
LOW	< 10E-7 cm/s; clay; shale; compact till; unfractured metamorphic and igneous rocks.
MEDIUM	10E-7 to < 10E-3 cm/s; silt, fine sand and silty sand; loess; silty clays; clay loams, silty loams, sandy loams, and loamy sands; less to moderately permeable limestones, dolomites, and sandstone; moderately permeable to coarse till; moderately fractured igneous and metamorphic rocks. Fill is considered moderately permeable unless disposal site-specific condition indicate otherwise.
HIGH	≥ 10E-3 cm/s; gravel, sand; highly fractured igneous and metamorphic rocks; permeable basalt and lavas; karst limestone and dolomite.

Examples for scoring Disposal Site Hydrogeology

EXAMPLE III-D-1

Scenario:	OHM is located in unsaturated sandy soils. The depth to groundwater is 24 feet. See Figure 2.
Score:	12 (High Permeability and Depth to Groundwater of 10.1 - 25 feet)
Rationale:	Score permeability to provide an accurate representation of subsurface conditions and migration potential.

EXAMPLE III-D-2

Scenario:	OHM has migrated to saturated soils, contaminating area groundwater. The unsaturated zone is composed of fine sands and silty sands, with a medium permeability. The saturated zone is composed of coarser sands, with a high permeability. Depth to groundwater is 4 feet. See Figure 3.
Score:	20 (High Permeability and Depth to Groundwater 0 - 5 feet)
Rationale:	Although the unsaturated zone is composed of a medium fine silty sands, the OHM has migrated to the coarse sand, which has a high permeability.

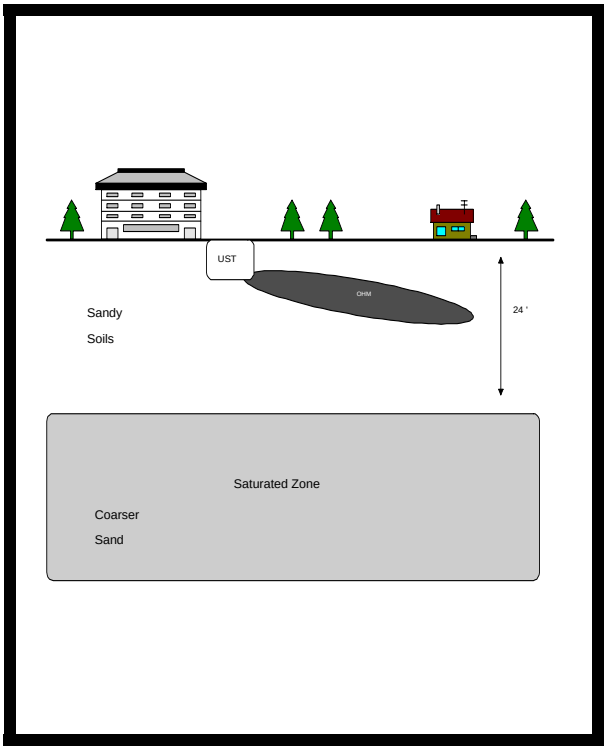


Figure 2

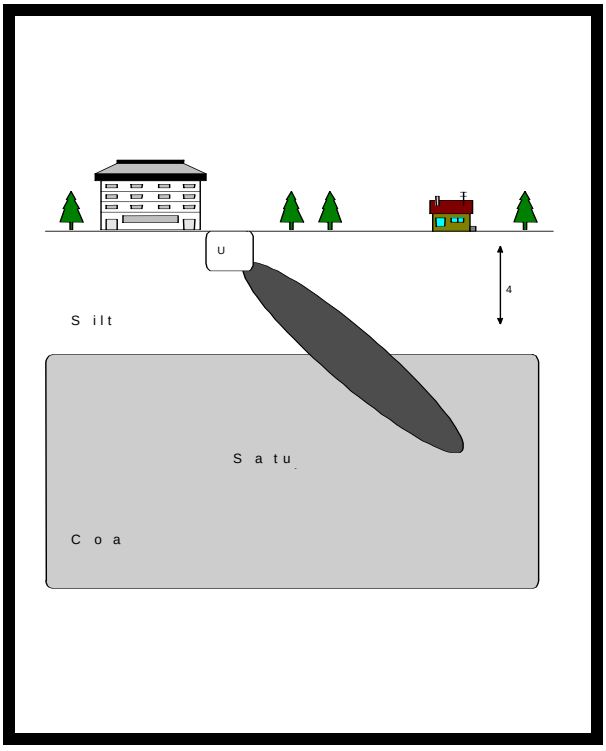


Figure 3

EXAMPLE III-D-3

Scenario:	A utility line, believed to lie in a gravel-lined trench, passes through the area of OHM contamination creating a preferential pathway for contaminant migration. The native soils in the area of OHM contamination are sandy loams. Depth to groundwater is 6 feet.
Score:	16
Rationale:	Where site-specific conditions affect soil permeability, the site score should reflect these conditions. Thus, although the native soils are of medium permeability, the gravel-lined utility trench is scored. Alternatively, Section VI. could be used to note the presence and potential impact of the utility line.

EXAMPLE III-D-4

Scenario:	Tidal influence at a site raises the groundwater table from 18 inches to 6 inches below the surface with each cycle. Site soils are composed of moderately permeable till.
Score:	16 (Medium Permeability and Depth to Groundwater 0 - 5 feet).
Rationale:	The site should be scored using the shallowest depth to groundwater that is typical of site conditions.

IV. HUMAN POPULATION AND LAND USES

(Scoring Range: 0 - 205 Points) (IV.A. + IV.B + IV.C.)

Section IV, Human Population and Land Uses, evaluates potential risks to the public from disposal site contaminants according to surrounding population (½ mile radius) and water use. *Reminder: The disposal site is defined as the known extent of contamination (including groundwater plumes) and is not limited to the boundaries of the property where the release occured (see page 1).*

IV.A. POPULATION *(Scoring Range: 0 - 40)*

IV.A.	HUMAN POPULATION			
Residential Population Within ½ Mile	None 0	1 - 99 5	100 - 999 10	≥ 1,000 15
Institutions Within 500 feet	None 0		One or More 10	
On-Site Workers	None 0	1 - 99 5	100 - 999 10	≥ 1,000 15

POPULATION DISCUSSION

Residential population: Residential population should include all persons who reside in a structure on a permanent or seasonal basis. Short-term seasonal residents (e.g., persons staying at hotels, cottages or campgrounds) should be counted.

Residential population should be based on census tract data or other appropriate sources. In rural areas, a visual survey of all houses within ½ mile should be performed. If this method is used, 3 residents per single family house should be assumed. In urban areas, assume a population greater than 1,000. Topographic maps should be ground-checked to ensure that the area has not been substantially developed since publication of the map. Population density data should be converted to absolute population within ½ mile.

Institutions means any publicly or privately owned hospital, health care facility, orphanage, nursing home, convalescent home, educational facilitiy or correctional facility, where such facility in whole or in part provides overnight housing. The presence or absence of institutions should be validated by a visual survey of the site surroundings.

On-Site Workers include full- and part-time employees at the property where the release occurred. When disposal site contamination has migrated to adjoining properties, the workers at those facilities must also be included. All on-site workers should be included in this estimate unless there is sufficient information to exclude one or more workers based on a detailed analysis of exposure potential (e.g., a Phase II Risk Assessment).

Examples for Scoring Human Population

EXAMPLE IV-A-1

Scenario:	A community has a much higher summer than year-round population.
Score:	Score the higher summer population.
Rationale:	The larger number, in this case, may provide a more accurate assessment of the population potentially affected. The summer population should include campgrounds, trailer parks and cottages.

EXAMPLE IV-A-2

Scenario:	The site consists of an automobile repair shop with an adjoining a private residence. The two residents of the house are the only employees. There are no other residences within ½ mile of the site.
Score:	10 (Residential Population) plus 5 (On-Site Workers)
Rationale:	In-home businesses should be counted both as on-site workers and as residential population.

EXAMPLE IV-A-3

Scenaro:	The site is an abandoned industrial facility. A security detail is assigned to the facility to prevent trespass.
Score:	Count security personnel as On-Site Workers.
Rationale:	Security personnel are counted in the same manner as facility workers.

EXAMPLE IV-A-4

Scenario:	The site is a fuel depot with numerous trucks entering the facility each day.
Score:	Count persons entering the facility throughout the day as on-site workers.
Rationale:	Where the "visiting workers" remain at a facility for an "extended" period of time, these workers should be counted. Mail carriers and express service personnel, on the other hand, typically are present for only a few minutes each day and should not be counted as on-site workers.

EXAMPLE IV-A-5

Scenario:	A former hospital is located within 500 feet of a site. No patients are housed in the facility, but administrative and maintenance staff remain employed at the facility.
Score:	0 (Institutions)
Rationale:	Score only active institutions. Similarly, former institutional buildings used for non-institutional purposes should not be scored as an institution. Employees of the facility would, however, be scored as On-Site Workers.

EXAMPLE IV-A-6

Scenario:	A large facility has a process building which is the source of the site contamination. An administration building is located upgradient from the administration building.
Score:	All employees on the facility (On-Site Workers).
Rationale:	Barring the preparation of a Phase II risk assessment for the office workers, all workers should be counted.

EXAMPLE IV-A-7

Scenario:	A site has a resident caretaker.
Score:	Both as on-site worker and a resident.
Rationale:	A person who works/resides on-site should be counted twice, once as a resident and once as an on-site worker.

EXAMPLE IV-A-8

Scenario:	A site is located on the grounds of a private boarding school (grades 9-12) with 150 students and 30 employees and staff. No permanent residences are located within ½ mile.
Score:	10 (Residential Population) plus 10 (Institutions) plus 10 (On-Site Workers).
Rationale:	The greatest number of people potentially exposed are present during the school year and counted as on-site workers.

EXAMPLE IV-A-9

Scenario:	A site is located on the grounds of an elementary school with 200 students, teachers and staff. The school is surrounded by more than 1,000 people within a 1’2 mile radius, but no institutions are within 500 feet.
Score:	25
Rationale:	

IV.B. AQUIFERS *(Scoring Range: 0 - 165)*

Consider each factor and score accordingly. Add all resulting scores for a total score.

IV.B.	AQUIFERS	
Sole Source Aquifer Name:_____	No 0	Yes 25
Potentially Productive Aquifer	No 0	Medium or High 15

AQUIFER DISCUSSION

***Sole Source Aquifers**:* This criteria considers whether the site is located directly over a designated sole source aquifer. Sole source aquifers are designated by EPA. Maps of designated sole source aquifers are available at DEP Boston and Regional Offices and from Mass GIS. All areas east of the Cape Cod Canal, including Nantucket, Martha's Vineyard, and the other islands are included as sole source aquifers. Only aquifers officially designated by EPA as sole source aquifers should be included in this category. Score 25 points if the disposal site is located over a sole source aquifer.

Potentially Productive Aquifers: This criteria considers whether the site is located directly over a designated potentially productive aquifer. Potentially productive aquifers means (a) all aquifers delineated by the U.S. Geological Survey (USGS) as a high or medium yield aquifer, except for any portion of a high or medium yield aquifer that is located in a municipality with a population density equal to or greater than 4,400 persons per square mile (based on the most recent US Census); and (b) all aquifers located east of the Cape Cod Canal (Cape Cod), on the Elizabeth Island, on Martha's Vineyard, or on Nantucket. Score 15 points if the disposal site is located over a medium or high yield potentially productive aquifer. This score is allocated regardless of the aquifer's use.

NOTE: It should be noted in using this manual that DEP is currently revising the MCP definition of "Potentially Productive Aquifer" The MCP should be checked for the most current definition prior to scoring a site.

Examples for scoring Aquifers

EXAMPLE IV-B-1

Scenario:	An aquifer is being investigated for possible listing as a sole source aquifer, but no recommendations or initial findings are available.
Score:	0 (No)
Rationale:	Do not score aquifers under study.

EXAMPLE IV-B-2

Scenario:	EPA is in the final stages of listing an aquifer as sole source.
Score:	15 (Yes)
Rationale:	Because the aquifer will be designated, the LSP should recognize that RAPS calls for scoring the site in the manner that best reflects current knowledge and conditions.

IV.C. WATER USE *(Scoring Range: 0 - 125)*

IV.C.WATER USE					
Proximity of Disposal Site to Public Drinking Water Supply Source	Not Applicable (NA) 0			Zone A 20	Zone II, IWPA, or SW Intake ≤ 400' 50
Persons Served by Public Drinking Water Supply	NA 0	25 - 999 5	1,000 - 4,999 10	5,000 - 49,999 20	≥ 50,000 25
Private Water Supplies Within 500 Feet	None 0		Commercial Industrial 10	Agriculture Residential (Not Ingested) 15	Drinking Food Processing 25
Alternative Public Water Supply Available (Viable Public Water Supply in Disposal Site Community *and* Public Water Connection ≤ 500 Feet from Site)	Yes 0			No 25	

WATER USE DISCUSSION

Zone A: The area within 400 feet laterally from the bank of a Class A surface drinking water source (as defined in 314 CMR 4.00) and its tributaries. Inactive but designated water supplies are included in this category. For purposes of disposal site scoring, hydrologic maps and other information should be consulted to determine the Zone A boundaries in proximity to the disposal site. Zone A boundaries should be based on a 400 foot distance from the edge of the surface water body and its tributaries within the sub-basin upstream of the intake for a public drinking water supply. Hydrologic information may be available on GIS, from the USGS, or local water suppliers.

Surface Water Intake: This subsection is concerned with the location of the OHM in relation to the surface drinking water intake. The exact location of the intake may be available on GIS or from the local water suppliers.

Zone II: That area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated, as approved by the Department's Division of Water Supply pursuant to 310 CMR 22.00. Maps of Zone II designations may be reviewed at DEP Regional Offices. Most Zone IIs are mapped on GIS.

IWPA: Means (1) with respect to public water supply wells and wellfields whose pumping rate is 100,000 gallons per day and for which the Department has not approved a hydrogeologically delineated Zone II, the ½ mile radius such well or wellfield; and (2) with respect to public water supply wells and wellfields whose pumping rate is less than 100,000 gallons per day and for which the Department has not approved a hydrogeologically delineated Zone II, the radius calculated by multiplying the maximum pumping rate is gallons per minute for such well or wellfield by 32 and adding 400 feet thereto (i.e., IWPA = (32) X (y) + 400); where y = pumping rate is gallons per minute).

Private Water Supply Well: Means a well which is utilized by a private water system. For purposes of 310 CMR 40.0000, the phrase "private water system" is used to refer to a system for the provision of piped water for human consumption that has fewer than 15 surface connections or does not regularly serve an average of at least 25 individuals daily at least 60 days of the year.

Public Water Supply Well: Means a source of water supply, including, but not limited to, primary, backup, and emergency sources, utilized by a public water system. For purposes of 310 CMR 40.0000, the terms "public water system," "primary source," "backup source," and "emergency source" shall have meaning ascribed to such terms by 310 CMR 22.02.

NOTES:

(1) Community wells serving more than 25 persons, regardless of public or private ownership of the well, must be counted as a public well.

(2) A number of small public water supplies may not be registered with DEP and may not be included in GIS. If there is reason to believe that a public water supply may be located near the site, check with local water supply officials.

(3) A site located within an IWPA may appear to be separated from the water supply well by a basin divide on the DEP Water Supply Atlas or GIS map. During the initial classification, this site should be scored as being within the IWPA, and some points may be subtracted in Section VI if supporting data is presented in the Phase I or other report. For a Permit Modification which is submitted for the purposes of reclassification of a Tier I site the Phase II report may be used to document additional hydrogeologic data showing that the groundwater contamination is clearly within a different drainage basin from the water supply. In this case, the site may be scored as outside the IWPA, subject to DEP approval of this and all other aspects of the Permit Modification.

(4) For NRS scoring purposes, Zone II, IWPA and Zone A designations are valid for active, emergency, temporarily inactive, and back-up public drinking water sources. DEP has found that a limited number of "closed" public wells are shown as active in current GIS maps. If a mapped well is actually closed with no intention for future use, a site reconnaisance should be conducted to confirm this situation. In addition, the well status should be checked with regional DEP DWS staff to verify the status.

Persons Served by Public Drinking Water Supply: Score this criteria *only* if the disposal site is within a Zone II or IWPA of a public drinking water supply or Zone A. In communities with mixed, or blended, distribution systems, include the total number of persons served by the entire system. Alternative numbers may be used only if a detailed analysis of OHM concentrations throughout the distribution system are conducted and documented in a Phase II Report.

Private Water Supplies are divided into four categories:

- *Commercial or Industrial Use (Non-Contact):* Generally defined as cooling or other process waters where there is no opportunity for physical contact.
- *Commercial or Industrial Use (Contact):* Any non-food related use of water in which workers come in contact with that water such as commercial car washes and industrial rinse water.
- *Agriculture/Aquaculture/Residential Non-Drinking:* Includes irrigation, animal feed/drink, shellfish/fish holding ponds, residential car-washing, or swimming pools.
- *Drinking/Food Processing:* Drinking includes any consumptive use including, for example, cooking and dishwashing. This category includes use of the private water supply for bathing/showering. Food processing includes uses such as cooking, canning, freezing, and washing and rinsing of produce or other foods (including at retail outlets).

DEP recognizes that the location of all private wells may not be known in all communities. For purposes of scoring the NRS, private well locations may be determined through consultation with appropriate local water suppliers, Boards of Health, Departments of Public Works, local surveys, and similar sources.

If there is no known public water supply or distribution system within 500 feet of the site, assume that any facilities or residences located within that area are served by private drinking water wells.

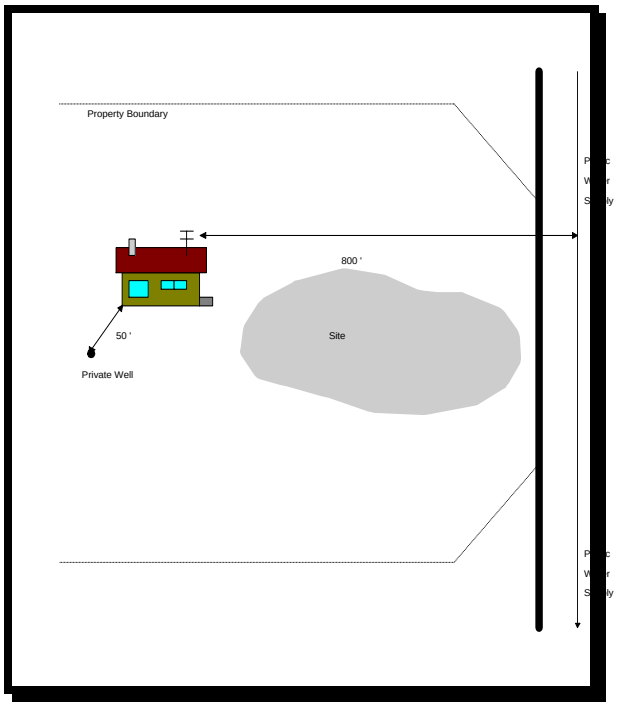
Alternative Public Water Supply Available: This question considers the availability of an alternative public water supply should drinking water sources become contaminated. Answer YES (0) if the disposal site community is served by a public water supply *and* the system is available to the area surrounding the disposal site (the current system connections to a public water supply distribution pipeline are located within 500 feet of any well that might be affected by the disposal site). Answer NO (25) if the disposal site community has either no public water supply system or if that system is unavailable to the disposal site area, or the nearest public water supply distribution pipeline connection is > 500 feet from any well that could be impacted by the disposal site.

Examples for scoring Water Use.

EXAMPLE IV-C-1

Scenario:	The disposal site is served by a public water supply. The site is within 500 feet of a private well but is located between the well and the nearest public supply. The total distance between the potentially affected private well and the nearest connection to the public water supply is greater than 500 feet. See Figure 5, below.
Score:	25 (Private Water Supply) plus 25 (No Alternative Public Water Supply)
Rationale:	The concern here is the distance between the potentially affected private well and the nearest connection to the public water supply, rather than the distance between the connection and the property boundary.

Figure 5



EXAMPLE IV-C-2

Scenario:	The site is located within an IWPA, but a Permit Modification for Site Reclassification includes a Phase II report which clearly demonstrates that a drainage divide is located between the site and the well.
Score:	0 (Do not score for IWPA, subject to approval of Permit Modification)
Rationale:	As long as the location of the divide is clearly documented in the Phase II Report submitted as part of the Permit Modification for Reclassification, scoring the site as outside of the zone of contribution may be justified, subject to DEP approval of the Permit Modification.

EXAMPLE IV-C-3

Scenario:	A site is located in the IWPA of a bedrock well. Based on Phase I information, the LSP does not believe the site is or will impact the well.
Score:	50 (IWPA)
Rationale:	Due to the difficulties associated with determining the recharge area of a bedrock well, the LSP must score the site as being within the IWPA.

EXAMPLE IV-C-4

Scenario:	A Zone II designation is in the approval process at DEP. The site is located within the IWPA, but outside of the proposed Zone II being reviewed by DEP.
Score:	50 (IWPA)
Rationale:	As with the example of the sole source aquifer, the LSP should score the site based on best available information. A Zone II only officially supercedes an IWPA when approved. Scoring the site based on the IWPA may not result in a fair assessment of the site. But, until the Zone II is approved, the IWPA remains the official zone of protection.

EXAMPLE IV-C-5

Scenario:	The site is in the Zone II of a well serving a blended system.
Score:	Score the total population served.
Rationale:	In a blended system, all persons served by the system should be counted.

EXAMPLE IV-C-6

Scenario:	A private well is used only seasonally.
Score:	Score as a year-round well.
Rationale:	Seasonal wells must be counted in the NRS, since they often serve as a principal source of drinking water.

EXAMPLE IV-C-7

Scenario:	A private well is located near the site. Reportedly, the well is not used, but pumping equipment and piping remain in place.
Score:	Score as a private drinking water well.
Rationale:	Although the well may not be in current use, it is not abandoned and the potential for future use remains. Only if the pipes were removed, the well sealed, and the well legally abandoned, could the well's presence be discounted.

EXAMPLE IV-C-8

Scenario:	The source of a site's OHM is located less than 500 feet from an alternative water source. However, the plume of contamination has migrated away from the source. There is a private water supply well within 500 feet of the plume. The residence served by the well is more than 500 feet from an alternative supply.
Score:	25 (Private Drinking Water Supply) plus 25 (No Alternative Public Water Supply Available)
Rationale:	This sub-section should be scored based on the location of the OHM, the drinking water supplies potentially affected, and the users of the water.

V. ECOLOGICAL POPULATION

(Scoring Range: 0 - 185)

Section V., Ecological Population, evaluates the potential risks posed to the environment by disposal site contaminants based on the proximity of the disposal site to sensitive environmental areas (Section V.A.). If the disposal site is located in or within NRS-established distances of one or more of these sensitive areas, resulting in a Section V.A. score of ≥ 30, a separate Environmental Toxicity Analysis (Section V.B.) must be conducted.

NOTE: If LRAs, IRAs, URAMs, RAMs, or other response actions in accordance with the MCP have been taken prior to completion of the NRS, only the contaminants and concentrations present after the action(s) should be scored provided that the remaining concentrations have been documented in the Phase I or other report.

NOTE: The disposal site is defined as the known extent of contamination (including groundwater plumes) and is not limited to the property boundaries where the release occurred.

V.A. RESOURCE AREA ANALYSIS *(Scoring Range: 0 - 150)* Add all scores.

V.A.ENVIRONMENTAL RESOURCE AREAS			
RESOURCE	*LOCATION*		
Area of Critical Environmental Concern	> 500' from Site 0	≤ 500' from Site 20	On-Site 30
Species of Special Concern, Threatened or Endangered Species Habitat	> 500' from Site 0	On-Site or ≤ 500' from Habitat 30	
Wetlands, Certified Vernal Pool, or Outstanding Resource Water	> 100' from Site 0	≤ 100' from Site 20	On-Site 30
Fish Habitat	> 500' from Site 0	≤ 500' from Site 20	On-Site 30
Protected Open Space (Local/State/Federal/Trustee)	> 500' from Site 0	≤ 500' from Site 20	On-Site 30

ENVIRONMENTAL RESOURCE AREAS DISCUSSION

Area of Critical Environmental Concern (ACEC): Means an area designated by the Secretary of Environmental Affairs, pursuant to 301 CMR 12.00, to protect natural areas of regional or state-wide significance. To determine

the locations, and distance of a disposal site from an Area of Critical Environmental Concern, consult the following documents.

- Mass GIS maps
- Site Summaries and Maps for All Designated Areas in Coastal Communities. Office of Coastal Zone Management, (August 1989)
- Coastal Areas of Critical Environmental Concern (ACECs). Office of Coastal Zone Management, (July 1991)
- Inland Areas of Critical Environmental Concern (ACECs). Department of Environmental Management, Division of Resource Conservation, (July 1991)

These information sources are updated periodically. For the most up-to-date information, consult with the Office of Coastal Zone Management, Executive Office of Environmental Affairs and the Division of Resource Conservation, Department of Environmental Management.

Species of Special Concern, Threatened and Endangered Species: Means those vertebrate and invertebrate species officially listed by the Massachusetts Division of Fisheries and Wildlife prusuant to 321 CMR 10.00. The Massachusetts Natural Heritage Program has identified critical habitats for species of special concern, and threatened and endangered species. Maps delineating habitat for these plant and animal species are available from the Natural Heritage Program, and from Mass GIS. Due to concerns about poaching, no information on the particular species found within a designated area is released by the Natural Heritage Program.

For NRS scoring purposes, only habitats mapped by the Natural Heritage Program, as of the date of the Site Classification must be scored. Knowledge of the presence of endangered species habitat in proximity to the site, which is not officially designated, should be reported to the Natural Heritage Program. On the advice of the Program, this situation would be scored as habitat.

Habitats registered and mapped after the complete Phase I or other Reports and NRS Scoresheets are submitted to DEP will not affect the disposal site score unless such information becomes available prior to the completion and submittal of the Phase II report. In this case, if the new information would change the site Classification, it must be presented with a Phase II report and new NRS score. The time limit on scoring for habitat does not affect future disposal site activities; disposal site activities that may impact species of special concern or threatened or endangered species remain subject to relevant state and federal laws and regulations.

Wetlands: The presence of *all* wetlands (any area subject to protection under the Wetlands Protection Act, MGL c. 131 Section 40, the regulations published at 314 CMR 9.00 under the Massachusetts Clean Waters Act, or Section 401 of the federal Water Pollution Control Act, 33 USC 1341, as amended) within 100 feet of the disposal site must be evaluated.

All permanent surface water bodies, inland and coastal 100-year floodplains of surface water bodies, all "isolated" wetlands of any size which contain wetland plant species and/or soils; and seasonal streams flowing into any of the areas listed above, are classified as wetlands and should be scored. Score 20 points if any portion of the disposal site is located within 100 feet of a wetland. Score 30 points if a wetland is located on any portion of the disposal site.

The NRS requires evaluation of wetlands in both Section II. and Section V. In Section II.C., Surface Water, wetland is evaluated at two levels: first, for the presence of OHM in any wetland; secondly, for the presence of a Restricted Wetland and OHM concentrations in relation to AWQC (for scoring Likely or Confirmed Exposure Pathway). In Section V., the definition of wetland includes all wetlands.

NOTE: Reporting of wetlands for purposes of completing the NRS does not affect the enforcement of any other applicable laws or regulations. All activities proposed within 100 feet of a wetland remain subject to the Wetlands Protection Act including review by the Conservation Commission of the municipality in which the wetland is located.

Certified Vernal Pools: Vernal pools are certified by the Division of Fisheries and Wildlife pursuant to 310 CMR 10.02(1). A vernal pool habitat is any confined basin depression which, at least in most years, holds water for a minimum of two continuous months during the spring and/or summer, and which are free of adult fish populations, as well as the area within 100 feet of the mean annual boundaries of the depressions, to the extent that the habitat is within an Area Subject to Protection Under the Wetlands Protection Act. The locations of certified vernal pools are available from Mass GIS and the Natural Heritage Program.

As with critical species habitat, only vernal pools designated and mapped at the time of Site Classification will be considered in the disposal site score. Vernal pools certified after the complete Phase I and NRS are received by DEP will not affect the disposal site score, unless the vernal pool is identified or site conditions documented in the Phase II changes the classification. All disposal site activities will be subject to any relevant laws or regulations, including subsequent vernal pool delineations.

Outstanding Resource Waters: Waters in the Commonwealth given a protected status due to their ecological, socioeconomic, recreational and/or aesthetic value pursuant to 314 CMR 4.04(3). Outstanding Resource Waters are designated and mapped by DEP. Please consult with the Bureau of Resource Protection at the Boston or Regional Offices for currently designated Outstanding Resource Waters.

Fish Habitat: Any surface water body that serves as habitat for fresh or marine fauna, including but not limited to, crustacean, fin fish and shellfish. For NRS scoring purposes, the entire coastline of Massachusetts shall be considered as a fish habitat. Any disposal site located 500 feet or less from the fish habitat is scored 20 points. Any disposal site with on-site fish habitats (example: a stream flowing through the disposal site) is scored 30 points. Fish habitat does not refer to the use of the water body for recreational or commercial fishing. For example, a fish-supporting water body where a fish-advisory for human consumption has been issued remains a fish habitat.

Protected Open Space/Natural Areas: State, Federal and local government-protected open space including, but not limited to, parks and forests, and watershed lands. This category also includes the conservation holdings of non-profit organizations such as the Massachusetts Audubon Society, The Trustees of Reservation (historical sites excluded), The Nature Conservancy, and similar local, regional, state or national organizations. This category does not include privately held properties on which conservation restrictions or easements are held. State and Federal protected open space and some Trustee holdings are shown on GIS. Local Government, Conservation Commission, and non-profit organizational holdings should be determined through consultation with the disposal site community's Conservation Commission and/or Zoning Board. This category does not include playgrounds, ballfields, or other purely recreational areas. The proximity of recreational areas is considered in Sections II and IV.

Examples for Scoring Environmental Resource Areas

EXAMPLE V-A-1

Scenario:	The site is investigated during a wet Spring. There are numerous large puddles throughout the property.
Score:	0 (No Wetlands)
Rationale:	Obvious puddles, which do not contain wetland plant species, and which were not formed as a result of the flooding of an adjacent water body, should not be considered wetlands or fish habitat.

EXAMPLE V-A-2

Scenario:	A site is in contact with a stream. OHM is impacting the stream. No fish are living near the discharge and for some distance downstream and slightly upstream; viable fish populations are present farther up- and downstream.
Score:	30 (Fish Habitat) plus 30 (Wetlands): TOTAL 60 Points
Rationale:	The impact of site related OHM should not be considered in this scenario. Considering the impact of OHM would in effect credit the site for destroying habitat. Only if the "entire" waterway is devoid of life, and when the site has not caused or contributed to this situation, would fish habitat not be scored. Surface water bodies such as streams, rivers, lakes, and ponds are wetlands.

EXAMPLE V-A-3

Scenario:	The site is adjacent to a drainage retention basin. The basin is populated by phragmites and other plant species typical of a disturbed wetland environment. The area regularly fills and drains in accordance with its design; standing water is usually not present in midsummer or drought conditions.
Score:	20 (Wetlands)
Rationale:	The presence of the wetland species requires scoring 20 points. In general, the LSP should also evaluate wetlands for their potential as a fish habitat. In this example, the seasonal drying of the wetland precludes it from being a fish habitat.

EXAMPLE V-A-4

Scenario:	OHM from a leaking UST has migrated to a salt marsh.
Score:	30 (Wetlands) and 30 (Fish Habitat): Total 60.
Rationale:	The presence of the OHM in the salt marsh makes the salt marsh part of the site. In general, salt marshes should also be scored as fish habitat.

EXAMPLE V-A-5

Scenario:	The site contains a permitted industrial wastewater lagoon, the construction and operation of which has been documented in the Phase I or other report.
Score:	0 (Wetlands and Fish Habitat)
Rationale:	An artificial surface water body constructed, used, and permitted solely for retention of industrial wastes is not considered a wetland or fish habitat.

EXAMPLE V-A-6

Scenario:	A golf course water hazard with wetland species is located 75 feet upgradient of a site. A field survey concluded that no fish are living in the "pond."
Score:	20 (Wetlands)
Rationale:	In this example, the water hazard is populated with bordering wetland plant species and must be scored as a wetland.

EXAMPLE V-A-7

EXAMPLE V-A-8

Scenario:	A golf course water hazard is located 400 feet upgradient of a site. Fish were observed swimming in the water.
Score:	0 (Wetlands) and 20 (Fish Habitat)
Rationale:	In this example, although the water hazard is populated with bordering wetland plant species, it is located more than 100 feet from the site and should not be scored as a wetland. However, because fish are present, the water hazard must be scored as a fish habitat.

Scenario: The site abuts city-owned lands designated as watershed. The lands are not mapped on GIS.

Score: 20 (Protected Open Space)

Rationale: Conservation lands, including watershed protection areas, owned by a municipality are protected open space.

EXAMPLE V-A-10

Scenario:	A private rod and gun club's hunting reserve is located adjacent to the site.
Score:	0 (Protected Open Space)
Rationale:	Private land holdings are not scored except for conservation lands owned by non-profit organizations incorporated for the purpose of land conservation such as the Trustees of Reservations, the Nature Conservancy and the Massachusetts Audubon Society.

EXAMPLE V-A-9

Scenario:	A city park with ballfields and playgrounds is located adjacent to the site.
Score:	0 (Protected Open Space)
Rationale:	Recreational areas are not classified as protected open space. For purposes of Section V., open space focuses on areas owned and protected for environmental/ecological purposes. The presence of the park would have been evaluated in Section II. and Section IV.

V.B. ENVIRONMENTAL TOXICITY ANALYSIS *(Scoring Range: 0 - 35)*

Section V.B. is scored only if the cumulative score of Section V.A. is ≥ 30. Section V.B. evaluates the environmental toxicity of disposal site contaminants in the same manner as Section III.A. considers human health-based toxicity. As with Section III.A., commonly found contaminants are listed in Table V.B. Circle the Environmental Toxicity Score associated with each disposal site contaminant and its highest detected concentration. Note that the concentration ranges in Section V.B. are different than those in Section III.A., reflecting the differences between human and environmental sensitivities.

In scoring Section V.B. (using either Table B.1. or Worksheet V.B.1.) assign only the highest score resulting from an examination of all disposal site contaminants. Do not add the scores.

NOTE: In determining the "highest detected concentration," do not average the contaminant concentrations. "Hot Spot" concentrations must also be included in determining the highest detected concentrations. However, if after the completion of an LRA, IRA, RAM, URAM or other remedial response, the remaining disposal site contaminant levels are reduced, the highest post-remediation concentration(s) may be used in scoring Section V.B. provided that the remaining contamination is documented in a Phase I or other report. Sediment concentrations must be based on dry weight measurements.

The Environmental Toxicity Score for contaminants not found in Table V.B. may be determined by using Worksheet V.B.1. and 310 CMR 40.1516 (Environmental Toxicity Values). Values in 40.1516 are derived from Ambient Water Quality Criteria (AWQC) and/or chemical structure; pesticides are assigned a value according to purpose. Petroleum and coal tar disposal sites should be scored based on the score of the mixture or individual constituents, whichever is higher.

V.B.	**ENVIRONMENTAL TOXICITY SCORE** *Highest Environmental Toxicity Score* *From Table V.B. or Worksheet V.B.1. on Following Pages.*	
OHM Scored: _____ Concentration and Media: _____		Toxicity Score (1 - 35) _____

Table V.B. ENVIRONMENTAL TOXICITY SCORE

OHM	***CONCENTRATION*** (soil/sediment: µg/g; surface/groundwater µg/l)				
	< 1	1 - 99	100 - 999	1,000 - 9,999	≥ 10,000
Arsenic	5	10	15	20	25
Benzene	0	1	5	10	15
Bis(2-ethylhexyl)phthalate *	5	10	15	20	25
Cadmium	10	15	20	25	30
Carbon Tetrachloride	0	1	5	10	15
Chlorobenzene *	5	10	15	20	25
Chromium III	1	5	10	15	20
Chromium VI	5	10	15	20	25

Table V.B.	**ENVIRONMENTAL TOXICITY SCORE**				
OHM	***CONCENTRATION*** (soil/sediment: µg/g; surface/groundwater µg/l)				
	< 1	1 - 99	100 - 999	1,000 - 9,999	≥ 10,000
Coal Tar *	5	10	15	20	25
Cyanide	5	10	15	20	25
1,1 Dichloroethane *	5	10	15	20	25
1,2 Dichloroethane	0	1	5	10	15
Ethylbenzene	0	1	5	10	15
Ethylene Dibromide *	5	10	15	20	25
#2 Fuel Oil (virgin product) *	1	5	10	15	20
Gasoline (virgin product) *	5	10	15	20	25
Lead	5	10	15	20	25
Mercury	15	20	25	30	35
Methylene Chloride *	5	10	15	20	25
Methyl Ethyl Ketone *	5	10	15	20	25
Methyl Tert Butyl Ether *	1	5	10	15	20
Nickel	1	5	10	15	20
Phenol	0	1	5	10	15
PAHs *	5	10	15	20	25
PCBs	15	20	25	30	35
Tetrachloroethylene	0	1	5	10	15
Toluene	0	1	5	10	15
1,1,1 Trichloroethane	0	1	5	10	15
Trichloroethylene	0	1	5	10	15
Vinyl Chloride *	5	10	15	20	25
Xylenes *	5	10	15	20	25
Zinc	1	5	10	15	20

***** Scores derived by default methods 40.1516(2).

As noted above, Worksheet V.B.1. is used to determine the Environmental Toxicity Scores for contaminants not found in Table V.B. All contaminants evaluated using Worksheet V.B.1. must be listed in *V.B.1.*

Worksheet V.B.1	**ENVIRONMENTAL TOXICITY SCORE**

ENVIRONMENTAL TOXICITY VALUE	*CONCENTRATION* Use µg/g for Soil and µg/l for Surface Water or Groundwater				
	< 1.0	1 - 99	100 - 999	1,000 - 9,900	≥ 10,000
10	0	1	5	10	15
20	1	5	10	15	20
30	5	10	15	20	25
40	10	15	20	25	30
50	15	20	25	30	35

V.B.1. *OHM and Concentrations Used in Section V.B.1.*

OHM	Environmental Toxicity Value	Concentration (Soil - µg/g)	Concentration (Water - µg/l)	**Environmental Toxicity Score**

Examples for Scoring Environmental Toxicity

EXAMPLE V-B-1

Scenario: A metal plating facility has released OHM into a wetland. OHM in sediments include Cadmium at concentrations of 4,500 µg/g and other metals.

Score: 25

Rationale: Although Cadmium did not result in the highest OHM Toxicity Score for humans, its higher relative environmental toxicity results in its being scored in Section V.

EXAMPLE V-B-2

Scenario:	Concentrations of OHM in water samples collected from a vernal pool on the site were less than applicable RCs.
Score:	Apply appropriate Section V.B. Score.
Rationale:	RCs are not relevant to scoring this Section. V.B. is scored based on Tables V.B. and V.B.1.

EXAMPLE V-B-3

Scenario:	Concentrations of OHM in water samples collected from a pond on the site were less than applicable RCs. Soil samples taken elsewhere on the site are significantly higher.
Score:	Score soil concentrations in Section V.B.
Rationale:	Section V.B. is concerned with the possible impacts on wetlands and wetland species. Accordingly, the highest site concentration should be used for scoring regardless of water concentrations.

VI. MITIGATING SITE-SPECIFIC CONDITIONS

Section VI. is included in the NRS in response to concerns regarding a means to alter a site score to reflect unusual site conditions that may not be accurately assessed by the NRS.

DEP anticipates that a limited percentage of NRS Classifications will require use of Section VI. The structure of the NRS and this guidance document allows the opportunity to develop data that would reflect accurate scoring of site conditions within the body of the NRS (Section II. - V.).

Section VI. allows an increase or decrease of the disposal site score of between 5 and 50 points in increments of 5 points, i.e., 5, 10, 15. However, a Section VI. score may not increase a score for a specific Section or sub-section to more than the maximum allowed for that particular Section or sub-section. Nor may the Section VI. score decrease a specific Section or sub-section score to less than the minimum score for the particular Section or sub-section.

NOTE: All information and discussion presented in Section VI. must be documented in the Phase I Report or later report(s), conducted in accordance with the requirements of the MCP, and referenced by specific page number(s).

VI.	**MITIGATING DISPOSAL SITE-SPECIFIC CONDITIONS**
Disposal site-specific conditions that warrant amending the site score. Changes directly related to NRS Sections or Subsection scores may not reduce the score more than the relevant subsection value assigned for the disposal site in that subsection. Section VI must reference specific pages of the Phase I. Section VI may not exceed ± 50 Points and may be scored only in 5-point increments. Attach additional pages as necessary.	
Actual Scoresheet contains additional space.	
Disposal Site Score Amendment (Not to Exceed ± 50 Points)	_____

If unusual or mitigating site conditions suggest that the NRS score should be amended, Section VI must be used if only the Phase I Report has been submitted to DEP. In Phase II Reclassifications, however, an alternative approach may be used. Phase II Report data may be used to directly amend the relevant Section or Subsection score, as opposed to use of Section VI only.

The following examples demonstrate when and how Section VI. can be used. The number of points scored in these examples should not be interpreted as definitive. The exact number of points scored in Section VI. should reflect site-specific conditions.

Examples for scoring Mitigating Conditions.

EXAMPLE VI-1

Scenario:	The site is located within an IWPA. A major drainage divide is shown on the GIS map and documented in the Phase I or other report.
Score:	Subtract 50 points in Section VI, noting that amendment relates to Section II.B. - Groundwater Exposure *or* Section IV.C. - Proximity to Drinking Water Source.
Rationale:	The information provided by the maps suggests that the site would not impact the drinking water source. Only a maximum of 50 points may be added or subtracted in Section VI.

EXAMPLE VI-2

Scenario:	A site has soils of medium permeability. A sewer line or utility conduit runs through the disposal site suggesting a preferential pathway for contamination migration.
Score:	Add 5 points in Section VI., noting relevance to Section III.D. - Soil Permeability.
Rationale:	The preferential pathway may have an effect similar to the site having a more permeable soil. The score is amended to reflect the score of "high" permeability, and uses the allowed 5-point increment.

EXAMPLE VI-3

Scenario:	A site is extremely limited in size. Section III.A. and III.B. scores appear to overestimate the severity of the site.
Score:	0
Rationale:	The spatial extent of OHM is not a factor in the NRS and may not be used to amend the score.

EXAMPLE VI-4

Scenario:	A fuel oil NAPL has been identified at a site. Fingerprinting identifies it as No. 2 fuel oil with low levels of PCBs. The Section III.A. score assigned used the No. 2 virgin fuel oil default.
Score:	Add 10 points in Section VI., noting relevance to Section III.A - OHM Toxicity.
Rationale:	The presence of the PCBs indicates that the release was not of a virgin product. The PCBs add an increased toxicity to the release. As the majority of the NAPL is identified as fuel oil, scoring the default and adding points in Section VI. to reflect the increased toxicity is appropriate.

EXAMPLE VI-5

Scenario:	A plume from a release extends into a Zone II. Concentrations within the Zone II are less than RCGW-1. Concentrations just outside the Zone II slightly exceed these standards. The site was assigned a Section II.B. score of 20 (Evidence of Contamination)
Score:	Add 50 points in Section VI., noting relevance to Section II.B. - Groundwater.
Rationale:	The elevated concentrations outside the Zone II suggest that continuing migration could result Rin RCGW-1 standards being exceeded in the near future.

EXAMPLE VI-6

Scenario:	Original site investigations detected NAPL. Later monitoring found no evidence of the NAPL, although no remedial response was conducted. The site was scored in Section II.B. and III.A. based on the latest conditions.
Score:	Add sufficient points in Section VI to reflect the toxicity of the OHM at the original NAPL thickness points in Section VI., noting relevance to Section III.A.
Rationale:	The "disappearance" of the NAPL suggests that additional data is needed to characterize the fate of the OHM. Scoring the site based on original conditions reflects a conservative approach to this uncertainty.

EXAMPLE VI-7

Scenario:	The disposal site contains a large number and high concentrations of highly toxic disposal site contaminants in different media.
Score:	Add points in Section VI., noting relevance to Section III.A - OHM Toxicity and Section V.B. - Environmental Toxicity (if scored).
Rationale:	The large numbers and concentrations of OHM suggest that adding points to reflect possible synergystic affects is reasonable.